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No. 1.

One of the significant educational developments of recent years has been the increasing recognition accorded to instruction in home economics. Although the term itself was unfamiliar a generation ago, at the present time home economics courses are being offered in this country in more than twelve hundred institutions, of which over two hundred are colleges and normal schools. Thirty-five of the land-grant colleges for white students are among the number, and twenty-seven of these offer four-year courses leading to degrees. Extension work has likewise been well organized in many of the States, largely with a view to reaching the women on the farm. In short, home economics instruction is already emerging from the pioneer stage and becoming an accepted factor in American education.

One of the principal obstacles which educators are encountering in their efforts to reduce the subject to sound pedagogical form is the comparatively retarded development of experimental work. It is well recognized that, as is the case with agriculture and other composite branches of learning, home economics is largely a specific application of the principles of chemistry, bacteriology, physics, and other sciences; but, as is also the case with agriculture, there are required to make it most effective special investigations and experiments, made from the standpoint of those who appreciate the needs and use to be made of such information.

Considering home economics as including the economic, sanitary, and esthetic aspects of food, clothing, and shelter as connected with their selection, preparation, and use by the family in the home or by other groups of people, it is a matter of everyday knowledge that many of its practical applications are still largely governed by rule-of-thumb or by tradition. For example, the laws of heat are well understood in the scientific world, but their application to cookery, food preservation, or the heating of houses needs far more investigation than it has thus far received. The present is preeminently the era of machinery, but the improvement of household appliances has

been left almost entirely to commercial exploitation, and progress has admittedly lagged far behind achievements in the factory and on the farm. Yet if there are to be reliable comparisons of the merits of different foods or textiles, or of different labor-saving or sanitary devices, there must be scientific tests by those familiar with the housekeeper's needs and competent to work out her problems.

The need of these studies is becoming the more imperative because of the increasing complexities of modern life. It is even more important now than it was a few years ago that there should be a scientific basis for instruction on how food materials can be best utilized in family diets, how houses should be constructed, furnished, and managed, and what materials are most suited for clothing, because of late years there has been less and less opportunity to acquire experience in such matters in the home itself. Two or three generations ago each home, and especially each rural home, was practically self-sufficient, producing not only its own food supply, but, to a certain extent, its own clothing, and constructing its buildings in such a simple way that any intelligent and experienced laborer could understand the principles involved. Now, however, a great many branches of work which were formerly home industries have been taken over by factories or by specialized workers, and there is no longer the opportunity to learn about them by practical trials in the home. In many cases such knowledge as is available is still, to a certain extent, handed down in an empirical way from mother to daughter, but in many others it would soon die out entirely did not schools or other educational agencies supply it, and these must acquire exact knowledge before they can transmit it.

It is true that many of the problems encountered are more or less isolated in application, and that much can be accomplished by individual initiative within the home. But it is as unreasonable to look to the farmer's wife for progress along technical lines, as to rely on the farmer to work out the fundamental principles of his art. As is pointed out by a recent writer on the subject, such knowledge as the housekeeper has "is in reality a by-product of a vast number of unrecorded and half-observed events. For the more exact and vastly more economical gathering of knowledge, by methods known to the laboratory, the housewife lacks the training and the outfit, especially the instruments of precision. Above all, she presides not over a laboratory, products of which are considered of no value except for teaching purposes, but over a factory the output of which—good food, clean and attractive rooms, suitable clothing, and all the rest—must not fail. By any methods known to her, usually those she has inherited, she must bring some semblance of these results to pass, and that daily."

Just as the trained experimenter was needed for the conversion of agriculture from a traditional to a scientific basis, all that relates to hygiene and household methods and the host of related questions demands careful study by experts having proper equipment for the undertaking.

Fortunately the dependence of home economics instruction upon research is becoming generally understood, and the belief that house-keeping is largely a matter of inspiration and feminine intuition, with no need of an accumulated store of information to draw upon, is rapidly giving way to the modern view that "a knowledge of house-keeping is not a matter of sex but of science." Nearly fifteen years ago the Secretary of Agriculture, in the Yearbook for 1897, pointed out that "the teachers of domestic science are not content to follow a dull routine of household drudgery in their teaching. They are appealing to the scientist and specialist in lines which touch the home life to explain the principles on which home practices should rest, and to show them how intelligent taste and skill can make the home a pleasant place to live in, and how scientific knowledge can enable the home-keeper to maintain the health and generally promote the physical well-being of those committed to her charge. Some progress has been made in formulating the replies which science is now able to give to inquiries relating to domestic science, and in undertaking investigations with a view to greatly broadening our knowledge of these matters in the days to come."

In the interval which has elapsed since these words were written much additional attention to research in problems affecting the home has been given, to some extent by home economic workers themselves and even more largely by scientists in associated lines. Agriculture in particular has contributed most valuable assistance, the community of interests between the production of food supplies, textiles, and other farm products and their utilization within the home being generally recognized.

Most of the agricultural experiment stations have from time to time studied problems which have to do with the handling, storing, and marketing of foods, while many have had to deal with food and drug inspection. They have also studied many technical as well as practical problems of milling and dairying, and other problems which pertain to the home as distinguished from the farm as an industrial enterprise. Of such work may be mentioned studies of the composition and digestibility of foods, numerous studies of cooking processes and of canning, dietary studies, the improvement in quality of cotton, flax, and wool, studies of household equipment and conveniences, and the cost of board for laborers on farms.

An important service has also been rendered by the engineering experiment stations established at several of the land-grant institu-

tions. Comparisons of different illuminants and fuels, and studies of sewage disposal plants and of building materials, may be cited as types of the work already undertaken.

It is well known that the Department of Agriculture has made a large number of contributions, the activities of nearly every bureau containing much of interest. The intimate connection of much of the work of the Bureau of Chemistry, the Bureau of Animal Industry, and the Bureau of Plant Industry is obvious, but there may also be mentioned the studies of household insects in the Bureau of Entomology, the utilization of woods by the Forest Service, some of the economic studies of the Bureau of Statistics, and a study in the relation of high altitude to cookery reported by the Weather Bureau. The nutrition investigations of this Office are, of course, accepted as fundamental by home economics educators, and the publications issued as part of the work are widely utilized as texts.

The contributions of home economics workers themselves have been numerous and meritorious, especially in view of the comparative newness of the subject and the lack of organized research agencies. The attention which is being concentrated on the preparation of research workers is yielding results of much promise, and the list of additions to knowledge in the form of theses for advanced degrees is each year becoming more impressive.

Contributions from the more mature workers actively engaged in instruction duties are even yet relatively few. This of course is unfortunate, since their qualifications and experience would seem to promise results of exceptional value. It is not, however, particularly surprising, for as was recently pointed out, "under present conditions, the task of the college teacher of home economics is a very difficult and complicated one. By study and research she must assemble and enlarge a new body of knowledge and give it pedagogical form. She must prepare manuals, text-books, apparatus, and illustrative material in this new subject. . . . Besides giving sound and thorough instruction to her college students, she must do a large amount of propaganda work to secure the general recognition of home economics in the elementary and secondary schools, and all she can of that broader extension work by which the multitudes of untrained women in the homes are to be encouraged and inspired."

* Notwithstanding these difficulties, to which may be added those imposed by an absence of funds for research and often of equipment, the uncertainties as to the publication of results, and the lack of many other advantages enjoyed by a regularly organized research institution, it is believed that there are many opportunities for adding to the store of knowledge by the use of existing facilities. If home economics embodies, as has been stated, "the utilization of

all the resources of science to improve the home life," then the chemist, the physicist, and the economist may each be expected to contribute his share. Studies corresponding, for instance, to those recently reported from the department of bacteriology of the University of Wisconsin on the sanitary value of vacuum cleaners, and on the preservative action of various spices, would doubtless occur to many a worker in these related sciences, and if brought to completion would be assured of immediate application.

Oftentimes, too, investigations already under way at the experiment stations may be legitimately extended to throw light on those phases of particular interest to the home. In other cases there may be cooperation with home economics departments to their mutual advantage. A study of this type was completed some time ago at the University of Missouri. Here the meats produced under controlled conditions in connection with nutrition studies of the station were utilized by a graduate student in home economics for an inquiry as to the relative economy of various cuts of beef.

An interesting development of recent years has been the establishment of commercial "housekeeping experiment stations." These have thus far given particular attention to household appliances, but the idea could doubtless be more widely extended.

The responsibility for real progress in research, however, must rest largely with the home economics departments. Whatever the assistance rendered by other agencies, the upbuilding of a distinctive body of home economics knowledge must come mainly from investigations by the home economics workers themselves, rather than through the mere adaptations of either traditional methods or "borrowed science." It is well known that this has already been the experience in agriculture, and the close analogy between the two studies warrants the prediction that the future of home economics instruction depends very largely upon its establishment on a sound scientific foundation by those to whom its development has been specifically intrusted.

Doubtless in many cases the undertaking of comprehensive investigations by home economics instructors is impracticable under present conditions, but as in the early days of agricultural instruction, there are a host of smaller projects awaiting and needing solution for which opportunity might be found. For instance, in the field of textiles, there may be cited studies of the relative durability of different fabrics as affected by such controllable conditions as the kind of material, its thickness, and its closeness of weave; the testing of various solvents in removing stains from fabrics; and the comparison of soaps and detergents in different waters and temperatures. There might well be additional studies of the comparative cost of household

fuels and illuminants, of the use of nonconducting materials in stoves and other cooking utensils, and of the solubility of kitchen ware in different waters, fruit acids, and other liquids. The preparation of systems of household accounts and the investigation of the lessening of the time requirements of household operations, the actual loss incurred by the purchase of supplies in uneconomical quantities and the incomplete utilization of "left overs," are other examples, such as will readily suggest themselves to the thoughtful observer. Many of these studies might readily be carried through during the long summer vacation, and others demand regular attention rather than large amounts of time.

In many of these cases not the least of the benefits to be secured would be the stimulation of the research spirit of the teacher, for the generally accepted opinion of President Jordan of Leland Stanford University that "no one can be a great teacher without the spirit of research; without this he lags behind the progress of knowledge and his mental equipment becomes second hand," is as applicable to home economics as to other subjects of instruction. There is also the same broadening and stimulating effect on advanced students in home economics as on those in other lines.

The increasing attention which is being devoted to the more thorough training of prospective teachers in research methods is a recent development which augurs well for the future. The steadily improving facilities for graduate study, the numerous summer schools now available, and in particular the inspiration of the Graduate School of Home Economics, which has just completed its fourth session at the Michigan State Agricultural College in close association with the Graduate School of Agriculture, are destined to add greatly to the ultimate efficiency of home economics instruction and experimentation. Once the inculcation of the spirit of research into the investigators of to-morrow can be accomplished, the establishment of home economics as a well-defined science will be assured, and its consistent development may be confidently awaited.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

A study of humus in Hawaiian soils, W. P. KELLEY and W. McGEORGE (*Hawaii Sta. Press Bul. 33, pp. 23, fig. 1*).—While studying Hawaiian soils as regards their humus content it was found that those soils obtained from the upper islands, which had a varied physical structure and in some instances a high percentage of clay and silt, gave unreliable results with the official method. As the clay in these soils could not be removed by any other means than by using the Cameron-Breazeale-Aiway clay filter method (E. S. R., 24, p. 9), the authors made an effort to overcome the difficulties which attend its use.

This was done by drawing the solution through the filter in the reverse direction from that usually employed. For the compression chamber was substituted an ordinary suction pump. "The tube of glazed porcelain, attached to the lower end of an 8-in. Pasteur-Chamberland tube, was broken off so as to leave this end of the tube open; then the tube was inserted into the upper opening of a bell jar, such as is used for filtering with suction, in a manner similar to that employed in the use of a Gooch. A large part of the tube was allowed to extend into the filtering jar and the connection was made air-tight by means of a short piece of Gooch tubing or a rubber stopper. It was also found desirable to coat the upper portion of the tube with paraffin so as to prevent the passage of the solution except in the lower half of the filter tube, otherwise the solution will pass down the side of the bell jar.

"A 50 cc. aliquot of humus solution (the preliminary extractions with hydrochloric acid were made by digesting 10 gm. of soil in 200 cc. of fifth-normal hydrochloric acid at ordinary laboratory temperature for 5 hours, filtering, and washing free from acid with distilled water, as outlined by Fraps in his directions for cooperative study of humus determination for the Association of Official Agricultural Chemists, May, 1911), which represented 1 gm. of soil, was drawn through the tube by means of reduced pressure, the filtrate being collected in a short cylinder. After the entire aliquot was drawn through, a 4 per cent solution of ammonia was then passed through so long as it showed any color. Usually about 200 cc. was required. In no instance was it found necessary to use more than 250 cc. The filtrate and washings were then evaporated to dryness and the determinations completed as usual.

"Some difficulty was experienced in completely removing the clay in certain soils. There was found to be considerable difference in different tubes in this respect. Some filters will remove all clay, while others seem to allow a small amount of the most finely divided clay to pass through. . . .

"The time required to complete a filtration was found to be about 3½ hours, and by arranging a number of filtering jars in a series an ordinary Richardson pump will provide suction for at least 3 filters, and with close-fitting con-

nections it is probably possible to operate $\frac{1}{2}$ doz. filters with one pump. In any event, at least $\frac{1}{2}$ doz. solutions can be filtered in one day by this apparatus."

"After each filtration the tube should be washed out. A test-tube brush was found to be serviceable in removing the clay from the inner walls of the filter tube."

The results obtained show that the modified clay filter method yields higher results than either the Hilgard, Mooers-Hampton, or the Cameron-Breazeale method, and lower results than the Rather and official methods. The latter 2 methods, however, could not be relied upon as far as Hawaiian soils are concerned. The Rather method in most instances did not bring about a coagulation of the clay. On the other hand, although the results obtained with the Mooers-Hampton, Hilgard, and Cameron-Breazeale methods at times furnished concordant results, on the whole they were found to be in disagreement.

It was furthermore noted that as much as 4 gm. of ammonium carbonate per 100 cc. of soil extract was necessary to effect a complete coagulation of the clay with the Rather, Rather modified, and the modified clay filter methods. In some instances, however, a partial precipitation of humus also took place with the Rather methods. Organic matter was precipitated with all the methods. The fundamental reason for the differences in coagulability of the clays seems to lie in the fact that the clays under examination were different in composition. The uncoagulated suspensions were always found to contain relatively more iron and correspondingly less aluminum. The iron and aluminum in such solutions were found to be present in about the proportions necessary for the formation of a double silicate.

The detection of nitrates with diphenylamin, H. CARON (*Ann. Chim. Analyt.*, 16 (1911), No. 6, pp. 211-215; *abs. in Chem. Zentbl.*, 1911, II, No. 6, p. 390).—The diphenylamin reaction for nitrates was found to depend upon the concentration of the diphenylamin and sulphuric acid and the temperature. The reaction was more pronounced if the diphenylamin was present in small quantities and concentrated sulphuric acid was used in the test.

The test is best conducted by adding to 1 volume of the solution containing the nitrate $2\frac{1}{2}$ volumes of a 0.002 per cent diphenylamin solution in concentrated sulphuric acid. The presence of hydrochloric acid or chlorides will not affect the reaction if concentrated sulphuric acid is used. If, however, diluted reagents are employed the presence of a drop of hydrochloric acid will render the reaction more sensitive. Glycerin, acetone, carbohydrates, salicylic acid, phenol, etc., destroy the intensity of the reaction more or less, particularly if the reagent employed has been prepared with concentrated sulphuric acid. When these substances are present the reagent must be prepared with hydrochloric acid.

The determination of nitrogen in commercial ammoniates, P. RUDNICK ET AL. (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 10, p. 783).—This is the second report of the committee on nitrogen, which was appointed by the division of fertilizer chemists of the American Chemical Society. It contains the reports of 15 analysts who determined the nitrate nitrogen according to the modified Gunning-Kjeldahl method and the moisture, using 2 gm. samples of fertilizer.

A wide range in the results on both moisture and nitrogen was reported, and no definite conclusions could be drawn. Local conditions of manipulation and reagents were deemed probably responsible for as much variation as any other factor. A further study of the subject with a view to the establishment of a standard sample is recommended.

An apparatus for preparing ammonium citrate solution, G. VECCHI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 1, pp. 56, 57, fig. 1).—A simple apparatus, which

can easily be constructed in the laboratory, for preparing as much as 5 liters of ammonium citrate solution at one time is described.

A critical study of methods for determining the hardness of natural waters, J. M. SILBER (*Arch. Hyg.*, 73 (1911), No. 2, pp. 171-182).—Wartha's method¹ for determining the transitory hardness, when modified according to the author's specifications, yields good results, but otherwise leads to error.

In regard to the determination of proteins and the digestion of protein by pepsin, F. WESTHAUSER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 72 (1911), No. 5-6, pp. 363-373; *abs. in Zentbl. Physiol.*, 25 (1911), No. 16, p. 673).—Determinations of proteins by Stutzer's method and by precipitation with tannin generally yield the same result. The methods can also be used for separating protein from amid nitrogen. On the other hand, varying results were obtained when the methods were used for separating the cleavage products resulting from the action of pepsin on protein. Identical results were obtained in fecal analyses.

The measurement of the oxidase content of plant juices, H. H. BUNZEL (*U. S. Dept. Agr., Bur. Plant Indus. Bul.* 238, pp. 40, pls. 2, figs. 9; *Jour. Amer. Chem. Soc.*, 34 (1912), No. 3, pp. 303-316, figs. 2).—Inasmuch as practically all of the tests heretofore reported for studying the activity of plant oxidases are of a more or less qualitative nature, a new method is described in which the oxygen is absorbed by pyrogallol through the agency of the plant juice, and the carbon dioxide developed is determined with sodium hydroxide. The oxygen absorbed is noted by means of the manometer.

The apparatus employed in the method is as follows: (a) A compact oxidase apparatus constructed entirely of glass, and with which it is possible to conduct the entire reaction, that is, oxygen and carbon dioxide absorption in the same apparatus (the apparatus also has connected with it a graduated apparatus for adding the reagents and the plant juice without disconnecting in any way); (b) a compact titration apparatus for determining the amount of carbon dioxide absorbed by the sodium hydrate solution; and (c) an electrically heated and controlled thermostat for conducting the oxidase reactions under uniform temperatures and conditions. The thermostat also contains a shaking device.

Some tests with the apparatus and potato peelings for furnishing the oxidase preparation, and some with normal beet leaves and others affected with curly top disease, are recorded, and which show that the apparatus furnishes concordant results.

On the determination of dry matter in roots, H. GOLDSCHMIDT (*Malkezeitg.*, 25 (1912), Nos. 1, pp. 12-15; 2, pp. 33-38; 3, pp. 63-70, figs. 4).—A new method of determining the dry matter content of roots is described, and the apparatus used is illustrated. Samples weighing about $\frac{1}{2}$ kg. are ground and dried in a specially constructed drying apparatus at steam heat for a period of from 48 to 72 hours, according to the number of samples being dried. Comparative results obtained with samples of different sizes are reported, showing a general agreement to within a few hundredths of 1 per cent.

A study of the carbohydrates in the prickly pear and its fruits, R. F. HARE (*New Mexico Sta. Bul.* 80, pp. 30).—This is a continuation of previous work (E. S. R., 19, p. 65). Among other objects, this investigation was to determine the composition of the mucilage, which this plant contains during its cycle of growth but which disappears at the ripening period, with a view of ascertaining its function and its possible economic uses.

"The juice of the ripe fruit contains 1.57 per cent of pentosans and only traces of galactan. When previously precipitated with lead acetate, the juice

¹*Ztschr. Angew. Chem.*, 15 (1902), No. 9, p. 198.

gave the anilin acetate reaction for pentose, but none for galactose. The presence of fructose and glucose in considerable amounts was quite definitely established by several reactions characteristic of these sugars.

"The dried mucilage of the prickly pear, when separated by precipitation with alcohol from a 2 per cent solution, contained 15 per cent of galactan, 31 per cent of pentosan, and 12 per cent of ash.

"The mucilage could not be separated completely from cell fragments, starch, crystals of calcium oxalate, and other solid particles that caused opalescence and turbidity. A dilute solution with 1.5 per cent of total soluble solid matter, rendered fairly clear by repeated filtration through silk, had no effect on polarized light. This was true of all the solutions of mucilage obtained in this work, both before and after subjecting them to acid hydrolysis. . . .

"Hydrolysis of the mucilage by digestion for several hours with 1.25 per cent sulphuric acid solution produced a sugar that had properties similar to arabinose. When its osazone was formed, oily globules rose to the surface. The precipitate was darker than glucosazone, readily soluble in hot water, and melted at near 160°.

"A 95 per cent alcoholic extract of the dried stems, previously treated with ether, contained a sugar with specific rotations made on three separate solutions of -8.6° , -8.25° , and -7.1° . The osazone produced from this sugar had properties similar to those of glucosazone. These results indicate the presence of mixtures of glucose and fructose in this extract.

"A 60 per cent alcoholic extract of the dried stems contained a substance apparently intermediate in character between mucilage and sugars. It did not reduce Fehling solution before hydrolysis, but was very readily hydrolyzed by dilute acids. Alcohol stronger than 60 per cent reprecipitated this material as a flocculent mass, quite different in appearance and properties from the precipitate of the mucilage with alcohol. The precipitate was readily soluble in water, but its solution was not mucilaginous. When hydrolyzed it gave a plus rotation to polarized light.

"The coloring matter can be concentrated and made into a marketable product, of value for coloring certain foods, by first removing mucilages and gums with alcohol, and precipitating the pigment from the filtrate with acetone.

"The pigment is evidently a glucosid. When separated from the juice with alcohol and acetone, and then precipitated with lead acetate, the coloring matter liberated by sulphuric acid gave a sugar on hydrolysis, with properties similar to those of glucose.

"The lead salt produced by precipitating the purified pigment with lead acetate contains 61.42 per cent lead."

A solution of the gum, while very viscous, possesses only a very low degree of adhesiveness.

The analysis and composition of grapes, R. BAUNER (*Rev. Vit.*, **37** (1912), No. 942, pp. 15-20).—This is a discussion in regard to the variations in the chemical composition of grapes during the cycle of growth. It includes analyses of the stems, skin, pulp, and seeds.

The composition of the apple as affected by irrigation, C. E. BRADLEY (*Jour. Indus. and Engin. Chem.*, **3** (1911) No. 7, pp. 496, 497).—Apples which were grown on irrigated soil were found to be somewhat higher in moisture, higher in sugar, and lower in solids than the samples which were obtained from the dry check plots. The apples were also larger, but the individual apples from a given space showed very little variation among themselves. The protein content of the peelings showed an average of 0.7 per cent and that of the edible portion only 0.2 per cent. Traces of starch were present in the samples tested.

Investigations in regard to the composition of pear and apple seeds, P. HUBER (*Landw. Vers. Stat.*, 75 (1911), No. 5-6, pp. 448-461).—A qualitative and quantitative study of pear and apple seeds, with particular reference to the oil, proteins, and carbohydrates which they contain, is summarized below:

Composition of pear and apple seeds.

	Pears (Theiler).			Pears (Reinholt).			Apples (Uster).		
	Decor- ticated seeds.	Hulls.	Whole seeds.	Decor- ticated seeds.	Hulls.	Whole seeds.	Decor- ticated seeds.	Hulls.	Whole seeds.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Weight relation of: deorticated seeds and hulls:									
In air-dry condition.....	58.90	41.10	100.00	68.70	31.30	100.00	62.50	37.50	100.00
After drying in water bath.....	58.84	36.53	92.37	64.36	28.46	92.82	58.44	33.53	91.97
In 100 gm. of dry substance:									
Fat (without lecithin)....	36.46	7.13	24.84	33.14	7.10	25.15	32.70	8.99	24.03
Sugar (as invert sugar)....	4.51	6.08	5.13	5.49	5.89	5.62	3.26	3.70	3.42
Pentosans.....	3.07	11.97	6.72	3.37	14.28	6.72	2.53	13.44	6.66
Crude fiber (nitrogen ash-free).....	2.61	24.47	10.90	2.14	18.48	7.15	1.47	21.98	8.96
Nitrogen.....	7.77	1.64	6.34	8.29	1.83	6.81	8.45	1.78	6.02
Ash.....	4.70	2.50	3.83	5.04	2.31	4.19	4.77	2.11	3.79
Phosphorus.....				1.07			1.01		
Carbohydrates (sugar):									
(a) Alcohol-soluble, reducing.....		.14		(.10)	(1.53)		(0.17)	(1.92)	
Alcohol-soluble after inversion.....	3.36	1.53	2.63	3.82	2.85	3.53	2.63	3.30	2.87
(b) Water-soluble after inversion.....	1.15	4.55	2.50	1.67	3.04	2.09	.63	.40	.55
(c) Dissolved by boiling with dilute HCl acid (includes pentosans).....		11.87 (9.10)			13.99 (9.60)			11.52	
Nitrogenous substances:									
(a) Protein nitrogen.....	7.21	1.53	4.96	7.79	1.70	5.92	7.68	1.38	4.87
(aa) As protein (factor 5.56).....	40.03	8.48	27.53	43.26	9.41	32.87	42.60	7.66	27.05
(b) Basic nitrogen.....	.30	0	.21	.27	.09	.22	.41		
(c) Amygdalin nitrogen.....							.08	Trace	
(cc) As amygdalin (factor 32.77).....							1.01	.07	.67
Phosphorus compounds:									
(a) Phosphorus in organic phosphates.....							.33		
(b) Phosphorus in organic phosphatids.....	.06	.032	.048	.04	.03	.032	.05	.02	.04
(bb) As lecithin (factor 20).....	1.51	.820	1.230	1.04	.66	.82	1.25	.51	.99

The hydrocyanic acid content of some seed and stone fruits, P. HUBER (*Landw. Vers. Stat.*, 75 (1911), No. 5-6, pp. 462-482).—The seeds of most of the pears which grow in Switzerland contain practically no amygdalin (less than 1 mg. in 100 gm.), but traces of emulsin-like enzymes, the activity of which is 100 times less than that of those present in sweet almonds. Apple seeds, on the other hand, contain from 0.62 to 1.38 per cent of amygdalin, calculated to dry substance, which corresponds to from 0.037 to 0.082 per cent of hydrocyanic acid. Sweet apple seeds (Uster) contained the least of those examined, while Holz contained the most. Apple-quince seed contained from 1.18 to 1.23 per cent of amygdalin, pear-quince seeds from 1.18 to 1.24 per cent, and the seeds of the Japanese quince (*Cydonia japonica*) 2.23 per cent.

Stones of the following fruits were also examined and showed amygdalin contents as follows: Black cherries (*Prunus avium*) 1.72 per cent, blue plums (*P. insiticia*) 4.33 per cent, plum (Reineclaude) 5.03 per cent, German prunes (*P. domestica*) 2.52 per cent, Welch prunes (*P. domestica*) 4.32 per cent,

apricots (*P. armeniaca*) 0.11 per cent, luzet (*P. armeniaca*) 0.29 per cent, and peaches (*P. persica*) 2.63 per cent.

By macerating the ground seeds for 3 hours in water, and then distilling, fairly constant values can be obtained for hydrocyanic acid having its origin from the amygdalin or other ginsosids through the interaction of emulsin contained in either the stones or seeds of fruits. About one-ninth of the hydrocyanic acid which can be theoretically obtained is converted into formic acid.

Analysis of mustard flour, A. DOMESGUE (*Jour. Pharm. et Chim.*, 7, ser., 4 (1911), No. 11, pp. 494-496, fig. 1; *abs. in Analyst*, 37 (1912), No. 431, pp. 55, 56).—On estimating the amount of mustard oil in mustard flour it is necessary to keep the distilling vapors from coming in contact with the rubber connections. Accordingly, the author uses an apparatus in which one end of the condenser is connected with the flask by means of a ground glass stopper, while the other end is bent downward at a right angle and dips into a graduated cylinder. The distillate is collected according to Lenormand's method, 20 cc. of deci-normal silver nitrate solution being added, and the solution made up to a bulk of 100 cc. The rest of the procedure is the usual one.

Commercial mustards usually contain from 0.2 to 0.9 per cent of oil. The French codex requires 0.7 per cent as a minimum for black mustard seed.

A recently discovered bacterial decomposition of sucrose, W. L. OWEN (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 7, pp. 481-486).—Previously noted from another source (E. S. R., 25, p. 110).

A new method for estimating sugar, F. VON FILLINGER (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 22 (1911), No. 10, pp. 605-607, fig. 1; *abs. in Analyst*, 37 (1912), No. 431, pp. 63, 64; *Ztschr. Angew. Chem.*, 25 (1912), No. 9, p. 431).—Three solutions are required: (a) 250 gm. of potassium sulphocyanate, 250 gm. of potassium carbonate, and 25 gm. of potassium bicarbonate in 1 liter; (b) 4.278 gm. of copper sulphate in a liter; (c) 200 gm. of potassium sulphocyanate, 250 gm. of potassium carbonate, 50 gm. of potassium bicarbonate, and 10.42 gm. of copper sulphate in a liter, and filtered. In the flask (vented) described 20 cc. of each of the solutions (a) and (b) are placed and brought up to the boiling point, and from the burette the sugar solution is added until the color is discharged. Solution (c) serves as a preliminary test to determine the concentration of the sugar solution approximately.

Extraction of grains and cattle foods for the determination of sugars: A comparison of the alcohol and the sodium carbonate digestions, A. H. BRYAN, A. GIVEN, and M. N. STRAUGHN (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 7, pp. 486-497).—Previously noted from another source (E. S. R., 25, p. 110).

Detection of salicylic acid, H. C. SHEPHERD and A. GROSS (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 7, pp. 492, 493; *abs. in Ztschr. Angew. Chem.*, 25 (1912), No. 9, p. 431).—To the solution to be tested from 4 to 5 drops of a 10 per cent potassium or sodium nitrite solution, from 4 to 5 drops of a 50 per cent acetic acid solution, and 1 drop of a 1 per cent copper sulphate solution are added. After each addition of the foregoing reagents the mixture is shaken. The mixture is then placed in a boiling water bath for 45 minutes, cooled, and the red color obtained when as little as from 0.005 to 0.01 mg. of salicylic acid is present noted against a white background. Where larger amounts of salicylic acid are present a stronger solution of copper sulphate is necessary.

In regard to the differences in the cleavage of casein, paracasein, and calcium paracaseinate of cow's and goat's milk by trypsin and pepsin, J. HÖSL (*Über Unterschiede in der tryptischen und peptischen Spaltung des Caseins, Paracaseins und des Paracaseinkalkes aus Kuh- und Ziegenmilch. Inaug. Diss., Univ. Bern, 1910, pp. 31*).—Casein and paracasein from cow's milk in vitro were found to behave alike toward trypsin. Paracasein is cleaved more thoroughly

by pepsin-hydrochloric acid than casein. The casein and paracasein from goat's milk reacted in the same manner as those from cow's milk.

Boiling test, alcohol test, and acidity degree of milk, O. RAMMSTEDT (*Ztschr. Offentl. Chem.*, 17 (1911), Nos. 23, pp. 441-455; 24, pp. 467-471; *abs. in Ztschr. Angew. Chem.*, 25 (1912), No. 9, p. 436).—No definite relation exists between the alcohol coagulation and the acidity of milk, but, on the other hand, the boiling, alcohol, and acid tests are of value as preliminary tests for milk hygienic work. Milk obtained under cleanly conditions has better keeping qualities than either pasteurized or raw market milks. The rennet, fermentation, catalase, reductase, and leucocyte tests are valuable in detecting impure milks.

The guaiac test for distinguishing between raw and boiled milk, K. SCHERN and W. SCHILLHASE (*Berlin. Tierärztl. Wchnschr.*, 27 (1911), No. 48, pp. 868, 869).—As all guaiac tinctures do not serve as reagents for distinguishing raw milk from boiled, the author proposes a formula for preparing a reagent which will give a positive intense blue coloration when raw milk is present. This formula consists of resin. guajaci 10 gm., guaiacoli 10 gm., perhydrol (3 per cent) 1 drop, and absolute alcohol 80 gm. This is termed the guaiac-guaiacol test. The use of the test in foot-and-mouth disease and tuberculosis is also considered.

Is the blue coloration obtained with tincture of guaiac an accurate indication that milk has not been boiled? H. TEWES (*Molk. Ztg. [Hüdesheim]*, 25 (1911), No. 79, pp. 1499, 1500).—If a brown color is obtained with the guaiac test, the milk in all probability has been boiled. If, on the contrary, a violet or blue coloration is obtained it is necessary first to determine whether some oxidizing agent or water has not been added to the milk. Boiled milk subsequently contaminated with bacteria or mill dust will also give a positive reaction.

The Schardinger reaction for milk, W. RULLMANN (*Biochem. Ztschr.*, 32 (1911), No. 5-6, pp. 446-472).—Milk containing micro-organisms and thermostable bodies and milk free from them decolorize together or alone Schardinger's methylene blue-formalin solution in a few minutes at temperatures varying from 45 to 50° C. The formaldehyde in the reagent may be replaced by an equivalent amount of formic acid, but the appearance of the reaction requires a much longer time. The reaction in sterilized milk with either methylene blue-formaldehyde solution, or methylene blue-formic acid solution is probably due to the presence of thermostable bodies. The age of the milk has no influence upon the reaction, providing of course that the milk remains sterile. If small amounts of sodium hydroxide, ammonium salts, and phosphates are added the reaction is accelerated, particularly if a little milk sugar is added at the same time. Milk sugar when added alone is inert. Increasing the temperature somewhat will also aid the acceleration of the reaction.

Raw, pasteurized, and sterilized milk, and milk which has been boiled for a certain time were found to behave differently as regards the time required for the decoloration of the reagent. This is probably due to the demineralization of the milk, which begins at +50°, the destruction of the enzyme, which starts in at 65 to 69°, and the decomposition of the proteins, which is influenced by heat.

Contrary to Sames and Römer's findings (*E. S. R.*, 23, p. 709; 24, p. 412), the author never noted the absence of a positive reaction with milks which were retained in the udder longer than usual, or was there ever any absence of the reaction in the initial milk.

The Rothenfusser reaction was found to be very accurate, and to detect an addition of 1 part of raw milk to 1,000 parts of boiled milk. The Schardinger

method, however, which does not necessitate the preparation of a milk serum, can be given the preference for use in the milk bacteriological laboratory.

The catalase reaction for detecting milks coming from cows affected with mastitis, E. HUYNEN (*Ann. Méd. Vét.*, 60 (1911), No. 5, pp. 279-290, figs. 4).—This reaction is of value for detecting the milk obtained from mastitic cows. A milk of which 5 cc. will yield 1.5 cc. of oxygen (from 2 cc. of 1 per cent hydrogen peroxid solution) is to be regarded with suspicion.

The volatile acidity of gum tragacanth compared with that of Indian gum, W. O. EMEY (*U. S. Dept. Agr., Bur. Chem. Circ.* 94, pp. 5, fig. 1).—As the amount of volatile acid developed by samples of gum tragacanth is nearly 7.5 times less than that contained in Indian gum (*Sterculia urens*), and that of both gums is relatively constant it is an easy matter to detect these gums, either alone or in a mixture. A method is described and results reported.

Determination of nicotin, G. BEERAND and M. JAVILLIER (*Ann. Chim. Analyt.*, 16 (1911), No. 7, pp. 251-256; abs. in *Chem. Ztg.*, 35 (1911), No. 72, p. 657).—This is a study of the silicotungstic acid method devised by the authors, which was found to yield excellent results under varying conditions, particularly in the presence of ammonium salts. The determination of nicotin in the presence of pyridin may be made accurately by slightly modifying the procedure, as pyridin and its homologues are optically inactive and both pyridin and nicotin are precipitated by silicotungstic acid. The results compare well with those obtained by Schloesing's method, although slightly higher.

An electrically controlled constant-temperature water bath for the immersion refractometer, H. C. GORE (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 7, pp. 506, 507, figs. 2).—Previously noted from another source (*E. S. R.*, 25, p. 311).

Mixing, stirring, and kneading, and the machines used for these purposes, H. FISCHER (*Mischen, Rühren, Kneten und die dazu verwendeten Maschinen. Leipzig*, 1911, pp. 90, figs. 122; rev. in *Amer. Chem. Jour.*, 47 (1912), No. 4, pp. 352, 353).—The book undertakes "to discuss the principles of the operations of mixing, stirring, and kneading as carried out in industrial chemical work, and to describe by diagrammatic sketches some of the leading forms of apparatus used, as far as this is necessary to show some applications of the principles."

* International catalogue of scientific literature. D—Chemistry (*Internat. Cat. Sci. Lit.*, 8 (1908), pp. VIII+1067).—This issue deals with the literature received between December, 1908, and November, 1909.

Yearly report in regard to the progress made in agricultural chemistry, edited by T. DIETRICH (*Jahresber. Agr. Chem.*, 3. ser., 12 (1909), pp. XXXIV+545; 13 (1910), pp. XXXVII+619).—These are the reports for the years 1909 and 1910, continuing previous work (*E. S. R.*, 22, p. 311).

Report of the official agricultural chemical, physical, and analytical laboratories of Belgium, 1910 (*Raps. Sta. Chim. et Phys. Agr. et Labs. Anal. [Belgium]*, 1910, pp. 75).—This is a report of the directors of the various state laboratories in regard to work in progress, and the results of examining feeding stuffs, fertilizers, foods, sugar beets, industrial products, and miscellaneous samples. In some instances the methods of analysis used in the investigations are included.

Modern chemical technology, edited by O. DAMMER (*Chemische Technologie der Neuzeit. Stuttgart*, 1910-11, vols. 1, pp. XV+852, figs. 217; 2, pp. XIX+1065, figs. 508; 3, pp. XXIV+1049, figs. 402).—This work, which has been written by 50 docents and practical men, embraces almost the entire field of chemical technology. The topics of interest to agriculture and agrotechny include paper, starch, dextrin, glucose, cane sugar, bread, wine, beer, alcohol, press yeast, utilization of waste yeast, vinegar, fats and oils, resins and balsams,

milk and dairy products, conserved fruits and vegetables, tannin, peat, water, and alkaloïds.

These books are to be companion volumes to the author's handbook on chemical technology.

Yearly reports in regard to the fermentation organisms, A. KOCH (*Jahresber. Gärungs-Organ.*, 18 (1907), pp. VIII+684; 19 (1908), pp. VIII+670).—These are the reports for 1907 and 1908 of the progress made in the field of the fermentation organisms.

Manufacture of starch, F. REHWALD (*Die Stärkefabrikation. Vienna and Leipzig, 1911, 4. ed. rev., pp. VII+302, figs. 87*).—This is a technological handbook giving methods for the manufacture of starch, dextrin, glucose, sirup, and sugar color.

METEOROLOGY—WATER.

The climate of Switzerland, J. MAURER, R. BILLWILLER, JR., and C. HESS (*Das Klima der Schweiz. Frauenfeld, Switzerland, 1909, vol. 1, pp. VIII+302, pls. 5, figs. 9; 1910, vol. 2, pp. V+217*).—The climatic features of Switzerland as shown by observations extending over 37 years (1864-1900) are described.

The influence of rain and of temperature of the air on cereal crops in the Governments of Saratov, Samara, and Tambov, S. KHABIZOMENOV (*Selsk. Khoz. Vestnik Tugo-Vostok, 1911, No. 4-6; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 12 (1911, No. 6, pp. 927, 928; *Internat. Inst. Agr. (Rome)*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 3, pp. 609, 610).—From a comparison of meteorological conditions and crop yields during 25 years, the following conclusions are drawn:

"Increase of rain in winter is accompanied by a parallel increase in the crops; abundant rainfall in November, December, January, February, and March is beneficial to all cereals, but heavy rains in April are on the contrary very injurious to them. Increased rainfall in August, September, October, and April causes a decrease in the crops of spring cereals, while winter cereals and perennial forage plants are not harmed. The explanation of the good and bad effect of rain must be sought for in pedology and in vegetable physiology. The effect of capillary action is the principal cause of the damage wrought by rain. A detailed description is given of the movement of water in the soil during the different seasons of the year.

"In the district of Saratov, as the temperature is below the optimum in autumn and winter, and above in June and July, it follows that during both these seasons the nitrification processes are retarded and hindered."

Precipitation in Havana in each month of the years 1859 to 1908, E. W. MÜLLER (*Tropenpflanzer*, 15 (1911), No. 12, pp. 678, 679).—A table gives the monthly and yearly averages for this period. The annual mean for the 50 years is 1,234.8 mm. (48.6 in.) The driest month is March, with a 50-year average of 51.8 mm., the wettest June, with an average of 166 mm.

Protection of Beaujolais against hail by electric barrages, J. PERRAUD (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 33 (1912), No. 11, pp. 324-332).—An account is given of the installation of the Beauchamp method (E. S. R., 22, p. 118) in this region.

Water powers of North Carolina (*N. C. Geol. and Econ. Survey Bul. 20, 1911, pp. 333, pls. 2, figs. 2*).—This bulletin has been prepared under the direction of M. O. Leighton and M. R. Hall of the U. S. Geological Survey. A large amount of data is presented relating to the flow and power of streams in North Carolina, including annual rainfall data, gage heights, and dis-

charge measurements. The topography of each stream basin and of the tributary drainage areas is described.

The data in general show that North Carolina has a large source of available water power both in the larger and the smaller streams. The "small power" streams may be found in all parts of the central and western portions of the State.

The origin and wholesomeness of the saline waters in the London Basin, J. C. THRESH (*Lancet* [London], 1912, I, No. 5, pp. 311, 315, 316).—This is a brief discussion of the results of examinations of waters derived from the chalk and Thanet sands under southeastern Essex, London, and other places, some of which contain as high as 70 grains per gallon of sodium chlorid and many average at least 50 grains per gallon. It is explained that these waters are derived from an admixture of sea water and chalk water altered by percolation through the Thanet sands. The sodium chlorid derived from the sea water remains unchanged while the calcium carbonate of the chalk water is converted into sodium carbonate. In spite of this unusual character, the waters are considered wholesome.

Purification tests of the water supply of Marseille, O. ARNAUD, C. FARRY, and MOTTESIEA (*Off. Internat. Hyg. Pub.* [Paris], *Bul. Mens.*, 3 (1911), No. 12, pp. 2177-2215, figs. 8).—Seven processes used in these tests are described and the results obtained with them are discussed. The processes included chemical precipitation, filtration, and purification by means of ozone and ultraviolet rays. The best results from an economic standpoint were obtained with a system of filtration with submerged sand filters, although good results were obtained by ozonization and treatment with ultraviolet rays.

Utilization of sludge in England, L. BATLEY (*Municipal Jour. and Engin.*, 32 (1912), No. 13, p. 483).—It is stated that "the economical utilization of waste products generally has advanced further in England than in this country and the disposal of sewage sludge or pressed sewage cake has been receiving considerable attention there within the past few years. Various methods of disposal have been suggested with the object of so treating the sewage that the expense entailed may be, as far as possible, more than covered by the receipts obtained from the sale of the products. An additional inducement is the fact that the problem of disposal of sewage sludge is a very present one and is yearly becoming more urgent."

The methods employed by various towns in England are briefly described. At Bradford the sludge is rendered to remove the grease which is sold as "Yorkshire grease" for \$40 per ton. The filter press cake remaining after the extraction of the grease and containing about 40 per cent of moisture is dried and sold as a fertilizer base for \$2.50 per ton, finding "a large and increasing market at home, on the Continent, and in the United States." At Chorley the sludge is used with satisfactory results for the manufacture of gas.

At other works in this region the method generally followed is to press the sludge into cake, containing from 60 to 75 per cent of moisture, and to give it away to farmers in the immediate vicinity or use it to fill up low lying land. Although the material has from 3 to 4 times as much fertilizing value as ordinary farmyard manure, it is in such form that there is little demand for it from farmers, who in some cases are paid from 12 to 24 cts. per load to remove it.

At Manchester part of the sludge from the filter beds is dried and sold as a fertilizer for \$5 per ton, the demand being much greater than the supply. At Kingston-on-Thames the sludge is mixed with various materials, including alum, blood, and clay, dried, and sold as a fertilizer by a private company under the name of "native guano" for from \$15 to \$20 per ton. At Norwich "a plant

is now being erected for pressing and drying the sludge and for recovering the grease which forms about 30 per cent of the dry product; the dry residue, which contains about 3 per cent nitrogen, to be sold as a fertilizer." At Tadcaster arrangements are being made to handle the sewage in much the same way as is done at Bradford, "and the product has already been sold in advance for several years to come, to be exported to the United States."

At Leeds the sludge is used for the manufacture of ammonia gas by destructive distillation, the ammonia being recovered in the form of ammonium sulphate which has a value of \$70 per ton. The residue from the retorts is used for the manufacture of artificial stone or bricks.

At Oldham the grease is recovered from the sludge by distillation with steam. The dry residue from this process is sold for a small price as a fertilizer. It is thought to have little value for this purpose because a large part of the nitrogen is driven off in the distillation.

In Dublin a part of the sewage sludge "is mixed in large tanks with a small proportion of spent brewery yeast and fermentation is started by the aid of hot water pipes. The organic matter separates out and is dried and sold as fertilizer in powder form under the name of 'Fertilite,' \$12 per ton being obtained, and it is understood that there is a large demand for it."

Sewage sludge disposal, I. BATLEY (*Municipal Engin.*, 42 (1912), No. 4, pp. 227-229).—This article covers much the same ground as that noted above.

The private sewage disposal plant, **J. VAN V. MANNING** (*Sci. Amer.*, 106 (1912), No. 15, pp. 332, 342, 343, figs. 6).—Simple systems adapted to the detached villa and farm or country house are described. The principal requirements of these disposal plants are "(1) preliminary treatment of sewage to liquefy solids and suspended impurities, and hold back grease, scum, and sludge; (2) purification of effluent by natural or artificial filtration; (3) an acre or more of land; and (4) slope sufficient for sewage to flow by gravity."

SOILS—FERTILIZERS.

Soils of the eastern United States and their use, **XXIX-XXXV, J. A. BONSTEEL** (*U. S. Dept. Agr., Bur. Soils Circs.* 54, pp. 8; 55, pp. 10; 56, pp. 8; 57, pp. 10; 58, pp. 11; 59, pp. 10; 60, pp. 13).—These circulars discuss the following soil types with respect to geographical distribution, characteristics, surface features and drainage, use, improvement, and crop adaptability.

Circular 54 deals with the Crowley silt loam, of which a total of 477,120 acres in 3 areas in central Arkansas and southwestern Louisiana has been surveyed and mapped by the Bureau of Soils.

Rice under irrigation constitutes the great dominant crop on this soil type, and it is stated that since 1885 the acreage has grown from practically nothing to hundreds of thousands of acres.

Circular 55 deals with the Chester loam of which a total of 600,680 acres in 3 areas in southeastern Pennsylvania, central Maryland, and north central Virginia has been surveyed and mapped.

The surface topography of the Chester loam is described as rolling to somewhat hilly and natural drainage is, therefore, well established. Some sections are considerably eroded and should be terraced and maintained in sod during a considerable portion of the crop rotation.

"The Chester loam is an excellent general-purpose farming soil; the principal crops grown are corn, wheat, oats, rye, potatoes, and hay."

Circular 56 deals with the Penn loam, of which a total of 320,266 acres in New Jersey, Pennsylvania, Maryland, and Virginia has been surveyed and

mapped. The soil is stated to be fairly well drained, but the more level portions of the type would be benefited by tile underdrainage.

Circular 57 discusses the Carrington silt loam of which a total of 739,584 acres in 7 areas in 5 States has been surveyed and mapped. This type is found upon the uplands of northern Indiana, southern Wisconsin and Minnesota, and in the eastern portion of both North and South Dakota. The drainage of the soil is adequate, as a rule, but in minor depressed areas tile drainage is considered necessary. The soil is well suited to the production of grains and grass, dairying and stock raising being the principal industry.

Circular 58 gives an account of the Carrington clay loam of which a total of 612,864 acres in 6 areas in 4 States has been surveyed and mapped. This type is found in southern Wisconsin, north and central Iowa, southern Minnesota, and eastern North Dakota. The drainage is good over the greater portion of the region, only small depressions requiring tile drains. "In the more southern and eastern areas corn, oats, and hay are the chief staple crops. Cabbages are raised as a special crop. Further north spring wheat, barley, rye, and flax are grown, while in the most western areas of its occurrence durum wheat is coming to be an important and profitable crop."

Circular 59 discusses the Marion silt loam of which a total of 694,040 acres in 4 areas in Missouri and Illinois has been surveyed and mapped. This is a prairie soil adapted to small grain farming, winter wheat constituting the most important crop with oats and hay occupying considerable acreage. Drainage is stated to be imperfect in this type of soil which is also low in organic matter and needs lime.

Circular 60 deals with the Volusia loam of which a total of 554,082 acres in 7 areas in northern Pennsylvania, southern and central New York, and north-eastern Ohio has been surveyed and mapped. It is described as a general farming and dairying soil with an altitude ranging from 600 to 1,500 ft., a rolling to hilly surface fairly well drained except in depressed and level areas, and adapted to the production of grass for hay and pasture. Oats constitute the chief crop and barley and winter wheat are grown to a limited extent. In the lower areas corn is grown for grain and at the high altitudes flint varieties may be grown for silage. Buckwheat is an important catch crop.

Soils of the Shenandoah River terrace: A revision of certain soils in the Albemarle area, Virginia, H. H. BENNETT (*U. S. Dept. Agr., Bur. Soils Circ. 53, pp. 16, figs. 4*).—In revising some of the soils of the Albemarle area, Virginia, particularly the Edgemont stony loam, the author proposes to classify those soils of the lower, smoother division of the original Edgemont stony loam as the Waynesboro and the Holston series; and those of the mountainous belt of the region, as the Dekalb series. The principal soil types under each series are described.

Soils in the San Luis Valley, Colo., M. H. LAPHAM (*U. S. Dept. Agr., Bur. Soils Circ. 52, pp. 26, fig. 1*).—The results of a reconnaissance survey of the region, including its climatic conditions, soils, and agriculture, are reported.

The region occupies a valley in south central Colorado about 80 miles long with a maximum width of 45 miles. The valley is flat and treeless. The soils of the foot slopes and alluvial fans are of porous, sandy, and gravelly character underlain by leachy, gravelly subsoils. The alluvial soils of the stream bottoms are usually sandy loams, loams, or clay loams underlain by gravelly subsoils. The soils of the marginal slopes are gravelly sand, sandy loam, or loam, and are derived mainly from volcanic rocks. They are leachy and not retentive of moisture. The northern and central parts of the valley contain small areas of the gravelly foot slope soils. The central and eastern parts of the valley

contain large areas of wind-drifted sands, broken by low flats without drainage and occupied in places by alkali lakes. Although only a relatively small proportion of the valley is now under cultivation, most of the soils are easily cultivated and well adapted to grains, grasses, legumes, and certain vegetables. Some of the lower lying slopes and depressions suffer from seepage water and alkali.

The agricultural possibilities of the Canal Zone. Part I, Reconnaissance soil survey, H. H. BENNETT (*U. S. Dept. Agr. Rpt. 95, pp. 5-38, pls. 10, fig. 1, map 1*).—This report which is accompanied by a paper on The Outlook for Agriculture in the Canal Zone (see p. 91) discusses the region with respect to physical features and area, climatic and agricultural conditions, forests, soils, and irrigation.

The soil material ranges from the fine beach sand through alluvial and coluvial clay loams of stream bottoms and lower slopes to the more predominant plastic, heavy residual clays of the hills. The residual clay types cover about 80 per cent of the available agricultural land and are formed through the decomposition in place of volcanic, igneous, and sedimentary rocks. The range in organic matter content of the residual types in samples analyzed was from 1.75 to 8.30 per cent, with few below 3 per cent. The clay loams of the bottoms and lower slopes contain sufficient organic matter and coarse grains to give a good tilth. The sandy lands which occur exclusively as narrow coast fringes consist principally of the coarser and more resistant particles of rock fragments, of stream sediments, and shore-line degradation products.

Characteristic of the soils are the small surface accumulation of vegetable mold and the strong resistance offered to erosion. The "rapid disappearance of plant remains is due in a large measure to the fact that the high humidity of the rainy seasons, followed by the winds of the warm dry season, favors rapid disintegration and oxidation of plant remains." The resistance to erosion is due to the universally low content of sand and high content of clay, coupled with the fact that the soils are never loosened by freezing. The lands are further assisted in holding place against wash by the dense vegetation and the almost total absence of cultivation.

Records of drainage in India, J. W. LEATHER (*Mém. Dept. Agr. India, Chem. Ser. 2 (1912), No. 2, pp. VIII+63-140, figs. 11; abt. in Chem. Abs., 6 (1912), No. 11, p. 1487*).—Studies of evaporation and of the amount, nitrate content, and movement of drainage water from fallow and from cropped soils at Cawnpore, 1903-1910, and at Pusa, 1906-1910, are reported. See also a previous note (*E. S. R., 23, p. 420*).

The evaporation was nearly independent of the season, whereas the drainage varied with the rainfall. A good crop reduced evaporation to two-thirds or one-half of that from fallow land. The amount of ammonia from both bare fallow and cropped land was as small as has been found at Rothamsted. The amount of nitrate in years of good rainfall was much greater than at Rothamsted. "The amount of nitrate in drainage water from cropped land is very much less than from fallow land, and there is some evidence that higher plants interfere with nitrification. Nitrification has been found at Pusa to be active only during wet weather and then only for a short time. The evidence of the Indian records goes to show that the water descending during wet weather passes very uniformly through the soil and not chiefly by means of 'larger channels' as has been commonly supposed."

Lysimeter investigations, 1911, E. KAUFER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 4 (1912), No. 2, pp. 129-133*).—This is a continuation of previous work (*E. S. R., 25, p. 21*), and reports studies on the influence of

ground-water levels maintained at heights of 15.76, 31.52, and 47.28 in., and of soil aeration on the yield of oats. It is stated that the season was very dry.

The high water levels increased the yield of straw substantially as compared with the lower levels. A ground-water level of 31.52 in. below the surface was most advantageous and the amount of water required by this method for the production of a pound of dry matter was 618 lbs. as compared with 550 lbs. by sprinkling. Aerating the soil decreased the yield of crops in most cases, which was thought to be due to the sandy soils used and to the dry season.

The flow of subsoil water, H. E. HULST (*Cairo Sci. Jour.*, 6 (1912), No. 65, pp. 27-32).—In this paper an attempt is made to give part of the theory of the flow of a liquid through a porous medium, and to obtain the general equation of flow as simply as possible without applying the theory to the solution of any problems. The phenomena dealt with are those occurring in the saturated portions of the soil.

Conservation of the soil, A. GRÉGOIRE (*Rev. Écon. Internat.*, 8 (1911), IV, No. 2, pp. 368-383; 9 (1912), I, No. 2, pp. 391-408; II, No. 2, pp. 417-432).—This is a discussion by the director of the agricultural experiment station of Gembloux, Belgium, of the chemical, physical, and economic factors of soil conservation.

The adsorption phenomena of cultivated soils, J. H. ABERSON (*Meded. Rijks Hoogere Land. Tuin en Boschbouwssch. [Wageningen]*, 5 (1911), No. 1, pp. 1-43, figs. 4; *Ztschr. Chem. u. Indus. Kolloide*, 10 (1912), No. 1, pp. 18-22; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 5, p. 243).—From the results of experiments with clay soils treated with varying amounts and concentrations of solutions of ammonium chlorid alone and with additions of calcium, potassium, and sodium chlorids and sodium nitrate, the author concludes that during the process of adsorption an equilibrium was established in the exchange of ions of the soil and of the added solution. It is held that this exchange of ions was not the result of a purely chemical reaction in the sense maintained by Guldberg and Waage. The addition of ions which reacted with those in the solution reduced the adsorption. Soil adsorption followed the same law as adsorption by charcoal, wool, silk, etc. Adsorption in the soil is held to be a function of the surface of the colloidal substances.

It would seem probable that the aluminum silicates in the soil are the compounds which take up the calcium, magnesium, potassium, and sodium ions, thus forming the adsorption compounds. There was a certain relation, although no exact proportionality, between adsorption and hygroscopicity (as determined by the Mitscherlich method) of the soil. Increasing the temperature lowered the adsorption of the soil just as in the case of other colloidal substances.

The biological absorption of soils, J. STOKLASA (*Chem. Ztg.*, 35 (1911), No. 154, pp. 1425-1427; *abs. in Chem. Zentbl.*, 1912, I, No. 12, p. 939).—Studies of the absorption of phosphate, potassium, ammonium, and nitrate ions from solutions of ammonium and potassium sulphates, ammonium and potassium chlorids, monocalcium phosphate, and potassium and calcium nitrates by sterilized and unsterilized soils, and soils inoculated with a culture of *Bacillus mycoides*, are reported. The process of absorption continued from 23 to 30 days, the solutions being allowed to percolate through the soil during this time.

The absorption of the phosphoric acid was from 3.8 to 14.5 per cent greater for the unsterilized than for the sterilized soils. This difference is attributed to the bacterial activity and is called the biological absorption. The biological absorption of all the ions was substantially smaller for acid or unsaturated and less fertile soils than for the alkaline or saturated and fertile soils. The

biological absorption increased with the alkaline character, porosity, presence of easily decomposed carbon compounds, and sufficient nitrogen in assimilable form. The absorption of ammonium and nitrate ions was dependent upon the presence of the phosphate and potassium ions. The absorption of the ammonium ion was from 3.42 to 8.01 per cent greater than that of the nitrate ion.

The general conclusion drawn is that in soil investigations, particularly as regards the question of productivity, account must be taken of the biological absorption as well as the physical and chemical absorption. It was found, for example, that rye plants made a much stronger growth in inoculated than in uninoculated, sterilized soils, thus indicating that the bacterial activity influenced the plant food of the soil and rendered it more readily assimilable by the plants. The productive soils showed a high biological absorption not only for the ammonium ion but for the phosphate and potassium ions as well.

Biochemical relations of the phosphate ion in the soil, J. STOKLASA (*Biochemischer Kreislauf des Phosphat-Ions im Boden*. Jena, 1911, pp. 159, pls. 12).—This is a reprint in book form of matter which has in large part already been noted from another source (E. S. R., 25, p. 624).

The loss of ammonia from soils and experiments on the nitrogen balance in pot experiments, P. EHRENBURG (*Fühling's Landw. Ztg.*, 61 (1912), No. 2, pp. 41-53).—This is a review of the work of O. Lemmermann (E. S. R., 26, p. 320), whose conclusions agree with those of the author as to the small losses of ammonia from the use of ammonium sulphate, and of A. Koch (E. S. R., 26, p. 319), who reports large losses of ammonia from the use of ammonium sulphate under certain conditions. The author maintains that Koch used much larger amounts of ammonium sulphate and of lime than are ordinarily applied in practice and that, therefore, his results have little or no practical significance.

The author also refers to the work of Kraus (E. S. R., 26, p. 516) as indicating that the wind may be an important factor in influencing the rate of evaporation of ammonia from the soil.

The loss of ammonia from manured soils, P. EHRENBURG (*Fühling's Landw. Ztg.*, 60 (1911), Nos. 13, pp. 441-452; 14, pp. 470-500).—This is a critical review of the work of P. Liechti and E. Ritter (E. S. R., 25, p. 22), in which it is maintained that the amount of manure used by these investigators in their experiments was in excess of that which is ordinarily applied in rational systems of cropping and that, therefore, the results of the work as bearing on the loss of ammonia have no practical value.

The loss of ammonia from soils, P. LIECHTI and E. RITTER (*Fühling's Landw. Ztg.*, 61 (1912), No. 3, pp. 83-109).—This is a reply to the above, pointing out in a general way the fallacy of applying the results of experiments with manure to those obtained with ammonium sulphate. It is held that manure contains its ammonia in the form of carbonate, which is much more susceptible to loss of ammonia than ammonium sulphate, and that there is danger of considerable loss of ammonia when manure is applied as is ordinarily done in practice.

Green manuring in Mysore, L. C. COLEMAN, B. N. IYENGAR, and N. SAMPATIENOBAR (*Dept. Agr. Mysore, Gen. Ser. Bul. 1*, 1912, pp. IV+22, pls. 8, figs. 3).—This bulletin gives the results of a 2-year study of green manuring as practiced in Mysore, particularly on paddy soils. It is shown that sunn hemp, cowpeas, different varieties of gram, and avaré are used to a considerable extent as green manuring, but that the practice is very variable and not so extensive as it should be. Suggestions regarding the improvement of methods are made.

The smells of manure works of Paris, O. BOUDOUARD (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 4, pp. 238-240; abs. in *Jour. Soc. Chem. Indus.*, 31

(1912), No. 4, p. 196).—An investigation of the conditions affecting the odors of manure works showed that stocks of mineral phosphates gave off little or no odor, but that dissolved bone and phosphatic guano evolved evil-smelling odors which were increased by elevation of temperature, stirring, and variations in pressure and electrical conditions of the air. Odors from dry fertilizers lessen with time, but from moist fertilizers intensify as they gradually dry.

Fertilizer resources of the United States, F. K. CAMERON, R. B. MOORE, ET AL. (*U. S. Senate, 62. Cong., 2. Sess., Doc. 190, 1912, pp. 290, pls. 19, figs. 3, maps 19*).—This document, transmitted to the Senate by the President of the United States, is "a preliminary report on the fertilizer resources of the United States, describing investigations which have been carried out by experts of the Bureau of Soils, following a special authorization by the last regular session of Congress," with appendixes containing technical reports on the natural phosphates of Tennessee, Kentucky, and Arkansas, with a list of references to the bibliography of phosphates; memoranda on the manufacture of acid phosphate in the Southern States and on the manufacture of sulphuric acid and ammonium sulphate in this country; data regarding alkali crusts containing 0.5 per cent or more of potash; a list of patents for the extraction of potash salts; memoranda regarding saline claims, potash deposits, etc., and jurisdiction over kelp groves; and papers dealing with the botany, chemistry, industrial uses, and food value of the kelps of the coast of the United States and Alaska, with a bibliography of the literature of marine algae and their uses. The report explains the purpose and scope of the work undertaken by the Bureau of Soils and summarizes the more important results of this work to date.

It is stated that \$120,000,000 worth of fertilizers are now annually used in this country, but that "a much increased production and wider use of commercial fertilizers must accompany or closely follow the economic changes and readjustments now taking place in the United States."

It is believed that the United States has within its borders supplies of raw materials for fertilizers which "will be ample for a long but indefinite period. . . . This country is fortunate in having within its confines enormous deposits of natural phosphates, including the well-known fields of South Carolina, Florida, Tennessee, Arkansas, and Kentucky, lesser deposits in many other States, and the greatest deposit of the world in Montana, Wyoming, Utah, and Idaho."

Deposits of nitrates "have been found in this country, but none of commercial importance have yet been exploited. Ammonium salts, a product of the coke ovens and gas furnaces, slaughterhouse products, cotton-seed meal, and in lesser quantities, other nitrogenous organic materials, are utilized in the manufacture of fertilizers. The so-called atmospheric products, calcium cyanamid and basic calcium nitrate, are finding an increased use." The search for nitrate deposits in the United States is being actively prosecuted and other sources of nitrogen, especially ammonium sulphate from by-products of coke ovens, are being developed.

"Up to the present there have been no sources of potash in this country commercially developed." The search for mineral deposits of potash, which has been actively carried on, has given results which seem to warrant the continuation of such investigations (see abstract below), but the report holds that the most promising source of potash yet discovered in the United States is the kelp groves along the Pacific coast. These kelps "are essentially different in certain respects from the Atlantic kelps and apparently from those of Japan. They yield a much higher percentage of potash (five or six times as much as the Atlantic kelps), but have a much lower percentage of iodine."

Is estimated that "the Pacific kelps can easily be made to yield upward of 1,000,000 tons of potassium chlorid annually, worth at least \$35,000,000, and that the cost of production can largely, if not entirely, be covered by the value of the iodine and other minor products. The value of the present annual importations of potash salts from Germany is, in round numbers, \$12,500,000."

Potash salts: Summary for 1911. W. C. PHALEN (*U. S. Geol. Survey, Advance Chapter from Mineral Resources of the United States, Calendar Year 1911, pp. 31*).—This is an advance chapter from Mineral Resources of the United States, 1911, and reports the progress in work by the U. S. Geological Survey, the Bureau of Soils of this Department, and private persons in the search for a domestic supply of potash, which has included investigations of "(1) saline residues, (2) natural and artificial bitterns, (3) alunite and similar minerals, (4) the igneous rocks containing as a lower safe limit at least 6 per cent of potash (K₂O), (5) the greensand marls of Kentucky, New Jersey, Tennessee, and probably other States, (6) organic sources, including wood ashes, beet-sugar molasses and residues, wool scourings, and seaweed." The work of the Geological Survey in 1911 included "(1) deep drilling for saline residues, (2) the collection and examination of natural and artificial bitterns and bitterns, (3) the examinations of deposits of alunite and other minerals containing potassium, (4) the examination of certain occurrences of igneous rocks known to contain large quantities of potash." At the time this report was made the deep drilling operations had not revealed potash deposits of commercial importance; one Ohio bittern had shown a considerable percentage of potash (3.9 per cent); a considerable deposit of rather pure alunite (hydrous potassium and aluminum sulphate) had been discovered near Marysville, Utah (*E. S. R.*, 26, p. 526); and the extensive leucite deposits of Sweetwater County, Wyo. (*E. S. R.*, 26, p. 623), had been examined and their potash capacity estimated at 197,349,617 short tons of potash. The examinations of samples of other igneous rocks, particularly those rich in potash feldspar and of the potash-yielding capacity of New Jersey, Kentucky, and Tennessee marls had revealed little new information of special commercial importance. Accounts are given of the fruitless search for potash salines in the Otero Basin, New Mexico (see below), of methods of recovering potash from alunite and other igneous rocks and marls, and of simple field and laboratory tests for potash.

Data are given regarding the consumption of potash salts in the United States, amounting to 672,639,581 lbs. valued at \$11,826,106 in 1911, and the production of potash from wood ashes in the United States (1,866,570 lbs. valued at \$88,940 in 1910), and reference is made to the industries in which potash salts are used.

The work of the Bureau of Soils of this Department on kelp as a source of potash (see abstract above) is summarized, attention being called to the recent establishment at Cardiff, on the coast of southern California, of a plant for the manufacture of potash from kelp.

An investigation of the Otero Basin, New Mexico, for potash salts. E. E. FREE (*U. S. Dept. Agr., Bur. Soils Circ. 61, pp. 7*).—An investigation which led to entirely negative results is briefly reported in this circular.

Potash from the Pacific kelps (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 2, pp. 76, 77).—This is a brief discussion based upon the work of the Bureau of Soils of this Department on the possibilities of potash production from Pacific coast kelps.

Leucite as a potash fertilizer. Z. BONOMI (*R. Lab. Chim. Agr. Udine, Ric. Sper. e Attiv. Spiegata*, 3 (1909-10), pp. 17-25).—Comparative tests of leucite

and potassium sulphate as fertilizers for medic and *Lotus corniculatus* are reported. The leucite showed considerable fertilizing value, but much less than potassium sulphate.

On the economic use of potassic fertilizers, Z. BONOMI (*R. Lab. Chim. Agr. Udine, Ric. Sper. e Attiv. Spiegata*, 3 (1909-10), pp. 39-53).—This is a fourth paper on this subject (*E. S. R.*, 20, p. 925), and reports tests of potassic fertilizers on clover and medic, the general conclusion being that the use of potassium sulphate on these crops was economical.

Comparative tests of calcium and sodium nitrates as fertilizers, Z. BONOMI (*R. Lab. Chim. Agr. Udine, Ric. Sper. e Attiv. Spiegata*, 3 (1909-10), pp. 27-32).—The results of the series of experiments reported in this article were variable, sometimes favoring one nitrate and sometimes the other, but indicating on the whole about an equal efficiency for the two.

Chilean production of nitrate, A. A. WINSLOW (*Daily Cons. and Trade Rpts. [U. S.]*, 14 (1911), No. 203, p. 959; 15 (1912), No. 79, p. 39).—It is stated that the production of nitrate in Chile in 1911 was the highest ever recorded. It amounted to 54,297,531 Spanish quintals (of 101.4 lbs. each) during the nitrate year ended June 30, 1911, and 54,784,271 quintals during the calendar year 1911. The production during the calendar year 1910 amounted to 53,590,000 quintals. The business was prosperous notwithstanding the low prices which prevailed during the first 6 months of the year, and which fell as low as \$1.66 per quintal on board steamer on the coast in March. The price, however, gradually advanced to \$1.94 per quintal in October.

New works, which it is estimated will increase the output 18,000,000 quintals per annum, were in progress during the year, and the Chilean congress authorized the further sale of nitrate lands.

"The consumption of nitrate during 1911 increased 108,000 tons. The United Kingdom consumed 10 per cent more than in 1910, the United States 10 per cent, Holland 7 per cent, Belgium 7 per cent, France 4 per cent, and Italy 12 per cent, while Germany consumed about 4 per cent less."

"Lime for Alabama soils, J. F. DUGGAR and M. J. FUNCHESS (*Alabama Col. Sta. Bul.* 161, pp. 301-324).—This bulletin discusses the forms, sources, and methods of application of lime, its action on different kinds of soils and crops, and its need in Alabama soils, and summarizes the results of experiments with lime in different parts of the State. It is stated that there are abundant sources of supply of lime in Alabama; also that there are large areas of acid soils in Alabama, although the exact extent of such soils has not been determined, and that "on most acid soils, as well as on some other soils, the use of lime generally increases the yield of most crops. . . ."

"In the lime tests made in various parts of Alabama the average increases in yield attributable to the use of lime were as follows: Cotton 23 per cent, corn 11, cowpeas (seed and hay) 14, peanuts 24, velvet bean hay 35, soy beans (seed and hay) 49, German millet hay 11, sorghum hay 47, chufas 0, and sweet potatoes (loss) 17 per cent."

The litmus paper test for determining whether a soil is acid is described.

Liming the soil, J. B. ABBOTT (*Indiana Sta. Circ.* 33, pp. 16, figs. 4).—This is a popular discussion of this subject adapted to Indiana conditions.

The uses of peat for fuel and other purposes, C. A. DAVIS (*U. S. Dept. Int., Bur. Mines Bul.* 16, 1911, pp. 214, pl. 1, fig. 1).—This bulletin gives the results of an investigation primarily into the possibility of the economic use of peat as a fuel in the United States. Incidentally attention was also given to other uses of peat, namely, for the production of ammonium compounds and other chemical products and for fertilizers and other agricultural purposes.

It is stated that "peat land may be cultivated with profit if the right crops are chosen and the peat is sufficiently drained, decomposed, and fertilized. Many of the peat swamps in the northern part of the country are, however, of a type that will scarcely repay cultivation, since the peat is very poorly decomposed and would be a long time in reaching a state in which it could be safely used for most crops."

"On the other hand, even poorly decomposed peat may be very profitably used in many ways on farms to increase the fertility of the land, and to add to its productiveness indirectly, by conserving and preserving other more salable articles, or by saving valuable waste matter which could not be kept except by its use."

AGRICULTURAL BOTANY.

British fungi and lichens, G. MASSEE (London, [1911], pp. X+551, pls. 42, figs. 19).—This book contains chapters on the classification of fungi, how to study them, their collection and preservation, ecology, edible and poisonous fungi, diseases caused by fungi, etc. In part 2, which constitutes the greater portion of the work, the systematic arrangement of fungi is treated at length, many of the species being illustrated by colored plates. A rather brief chapter on lichens concludes the text. The primary object of the work is said to be to enable the reader to determine the names of the indigenous mushrooms, toadstools, etc.

Enzym studies of lower fungi, A. W. DOX (*Plant World*, 15 (1912); No. 2, pp. 40-43).—During the progress of a study of fungi, including the more common saprophytic molds, the author has demonstrated the presence of 14 enzymes and he shows their ability to hydrolyze various substances and the products of the hydrolysis. From the data obtained in the study of fungus enzymes, he believes that there is much to argue against the present conceptions of the specificity of enzymes.

Oxidizing enzymes in certain fungi pathogenic for plants, H. S. REED and H. S. STAHL (*Abstr. in Science*, n. ser., 35 (1912), No. 897, p. 396).—The authors call attention to the difference in the oxidizing ability of plant extracts as altered by parasitic fungi. The extracts of apples invaded by *Sphaeropsis malorum* are said to show no oxidizing powers, while those attacked by *Glomerella rufomaculans* show a somewhat increased oxidizing ability. When grown in pure cultures on synthetic media *Glomerella* was found to develop oxidizing enzymes in certain media but not in others.

The root nodules of *Myrica gale*, W. B. BOTTOMLEY (*Ann. Bot. [London]*, 26 (1912), No. 101, pp. 111-117, pls. 2).—The author reports a study of the origin and structure of the root nodules occurring on *M. gale*, only 4 groups of nonleguminous plants, alders, *Elæagnus*, *Podocarpus*, and cycads, having previously been recognized as possessing root nodules which are concerned with the assimilation of atmospheric nitrogen.

The peculiar nodule formations on the roots of *M. gale* have been frequently described, and the author has determined that from their structure they are outgrowths of lateral rootlets. They are caused by the presence of bacteria which are evidently similar to *Pseudomonas radiclecola*, and experiments in flasks inoculated with cultures showed an increase of 2.05 mg. of nitrogen per 100 cc. of culture. Experiments with *Myrica* plants grown in sterilized soil showed that they did not flourish unless they possessed root tubercles. Plants devoid of tubercles, after inoculation with a culture, developed root nodules and grew well.

The morphology of the root tubercles of *Alnus* and *Elæagnus*, and the polymorphism of the organism causing their formation, ERHEL R. SPRATT

(*Ann. Bot. [London]*, 26 (1912), No. 101, pp. 119-128, pls. 2).—A study of the root tubercles of *Ainus* and *Elaeagnus* proves that they are modified lateral roots and are produced by infection of the root with a race of the nitrogen-fixing organism *Pseudomonas radicola*. This bacillus enters the root and propagates itself in the cortex of the nodule as a rod-shaped organism. *P. radicola* is believed to be a polymorphic organism exhibiting the bacillus and coccus forms. In *Elaeagnus* the bacteria are found mainly in the region immediately behind the growing point, while in *Ainus* the bacteroid tissue traverses the entire length of the nodule. The coccus form is believed to be correlated with a scarcity of available carbohydrates and a change of environment, and it is more resistant to the influence of external agencies than the rod-shaped form. The organism was proved to be capable of fixing free atmospheric nitrogen when isolated from the tubercles.

Nitrogen nutrition of *Aspergillus niger*, W. BRENNER (*Ber. Deut. Bot. Gesell.*, 29 (1911), No. 8, pp. 479-483; *abs. in Jour. Chem. Soc. [London]*, 191 (1912), No. 591, II, p. 77).—Experiments with *A. niger* in which a large number of forms of nitrogen were used are reported, and it is shown that ammonium lactate, tartrate, succinate, and oxalate, and asparagin were the most suitable compounds, followed by carbamid and the mineral salts of ammonia. In the case of pyridin nitrate, only the nitric nitrogen seemed to be assimilated. Free ammonia, sodium nitrite, ammonium valerate, and potassium cyanid were toxic.

The rôle of nitrogen in plant metabolism, J. M. PETRIE (*Proc. Linn. Soc. N. S. Wales*, 36 (1911), pt. 1, pp. 97-140, *figs.* 1).—In continuation of previous studies (E. S. R., 22, p. 437), a further account is given of the rôle of nitrogen in plant metabolism. Studies are reported on the distribution of nitrogen in the seeds of *Acacia pycnantha*, the nitrogen in ripening seeds of *Vicia* spp., and the occurrence of potassium nitrate in plants. This latter substance, though one of the principal forms in which plants receive their nitrogen from the soil, was found by the author stored as a reserve in considerable quantity in a shrub, *Solandra grandiflora*.

The author believes that in green plants nitrates contribute to the formation of protein, without light, provided that carbohydrates be supplied, and that this change always begins by a reduction of the nitrates through nitrites to ammonia. Instead of the sudden transformation of the nitrate, he thinks it more probable that the enzymic reduction of nitrate to ammonia is the natural one. It is believed that the stages are the formation of ammonia, the production of hydrocyanic acid from formaldehyde through formic acid, ammonium formate, and formamid, and in the same way the passage of aldehydes in general through their acid amids to nitriles. From the interaction of ammonia, hydrocyanic acid or nitriles, and the various aldehydes, can be produced the amino-acids, and hence the synthesis of proteids.

Can humus be directly assimilated by the higher plants? M. MOLLARD (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 5, pp. 291-294).—Experiments are reported with radishes grown in tubes containing sterilized and unsterilized soil to which was added ordinary soil humus. The analyses of the dry matter obtained showed in some instances an increase and in others a decrease of carbon, which must have come from the humus in the culture. The difference, however, was so slight that the author concludes that if humic material is directly assimilable by green plants it is in a very insignificant amount.

The influence of phytin on seedlings, A. R. ROSE (*Abstr. in Science*, n. ser., 35 (1912), No. 897, p. 393).—Phytin, which is found almost universally in seeds and is considered to play a significant rôle in their germination, has been investigated to determine if possible what the influence of the phosphorus com-

pound may be upon the earliest growth of the plants. Lupine seedlings were germinated and afterwards allowed to grow in nutrient solutions, some of which contained a phytin compound.

The results seemed to indicate that the several phytates behave in the same manner as the corresponding orthophosphates. There was no suggestion of any specific influence of the phytic anion upon the seedlings. The phytin solutions in which the seedlings had been grown showed no increase in inorganic phosphorus or inositol, and there was, therefore, no evidence that the phytase of the seed acted upon the phytin in the surrounding liquid.

The action of sulphur on plants, E. BOULLANGER (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 6, pp. 369, 370).—In the course of some experiments on catalytic fertilizers, a series was carried on with carrots, beans, celery, lettuce, chicory, potatoes, onions, etc., in which 70 gm. of sulphur was added to 30 kg. of soil. The influence of the sulphur was apparent in every case and in some very conspicuous, exerting a favorable action on the growth of the plants and notably increasing the yield. Another series of experiments with sulphur used in connection with sterilized and nonsterilized soil showed that the action of the sulphur was quite pronounced with ordinary soil but had a very feeble effect with the soil that had been sterilized.

From this it is believed that sulphur does not act directly upon the bacterial flora of the soil nor assist materially in the development of certain organisms. Its exact action is to be investigated further.

The effect of ether and carbon bisulphid on plants, A. KOCH (*Centbl. Bakt. [etc.]*, 2. Abt., 31 (1911), No. 5-10, pp. 175-185; *abs. in Jour. Chem. Soc. [London]*, 100 (1911), No. 590, II, p. 1124).—Experiments are reported on the growth of buckwheat and mustard in soils that had been treated with ether and carbon bisulphid in varying quantities. Two crops were grown in each pot, one immediately following the application of the ether and the other seeded after the first crop had been removed.

A greater total yield as well as a higher amount of combined nitrogen was always found in the plants immediately following the application of the ether. The second crop, whether it was mustard or buckwheat, was less in yield and combined nitrogen than the first, and in some cases less than the check pots.

The investigations seem to show that the activity of the ether and carbon bisulphid is exerted in stimulating the development of the plant and that the increased yields were due to this fact and not to the influence of the substances on the nitrifying and denitrifying organisms.

Experiments with yeasts showed that fermentation was favored by a small amount of ether. Carbon bisulphid gave negative results, while it appeared to delay acid formation in the fermenting mash.

The effect of guanidin on plants under different conditions, O. SCHREINER and J. J. SKINNER (*Abstr. in Science*, n. ser., 35 (1912), No. 897, p. 391).—The effect of 50 parts per million of guanidin, which has been generally considered harmful to plants, was tested on wheat seedlings in solution cultures and in soils.

Its toxicity did not show until the fifth or sixth day, when spots appeared on the leaves, but soon the plant was completely affected, falling over by the end of the second week. The effect of nitrates in the cultures was especially striking in that the harmful effect first showed itself in the cultures highest in nitrates and spread gradually to those lower in nitrates, frequently not appearing at all in those cultures which contained phosphate and potash but no nitrate. This seems to be an instance of a harmful nitrogenous constituent, accentuated by nitrates.

The influence of chemicals on the germinating capacity of dodders, G. D'IPPOLITO (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 3-4, pp. 361-368; *qbs. in Riv. Patol. Veg.*, 5 (1911), No. 6, p. 86; *Chem. Zentbl.*, 1911, II, No. 6, p. 370; *Jour. Chem. Soc. [London]*, 102 (1912), No. 591, II, p. 88).—Experiments are reported on the use of chemicals for destroying *Cuscuta arvensis* and *C. trifolia*.

Ammonium nitrate, sodium carbonate, calcium cyanamid, and formalin were found to kill dodder seeds, while potassium nitrate and carbonate did not entirely inhibit their germinating capacity. Sodium and calcium nitrates were less efficient, and magnesium sulphate is said to have had hardly any action.

The author recommends, for destroying dodder seeds in the soil, treatment with either a 2 per cent solution of ammonium nitrate or a 1 per cent solution of formalin.

The sterilization of seed in relation to the micro-organisms contained by them, G. ROSSI (*Rend. Soc. Chim. Ital.*, 2. ser., 2 (1910), pp. 276-280).—The difficulty of completely sterilizing seed without destroying their germinative ability is well known. The author gives the results of experiments to secure the sterilization of a number of kinds of seed. Lots of 25 seeds of each kind were placed for 3 hours in a 3 per cent solution of hydrogen peroxide, after which single seeds were transferred to tubes and placed in an incubator, where they were kept for 25 days.

No species of seed remained completely sterile, molds and bacteria making their appearance in different lots in from 5 to 15 days. Fifteen tubes containing seed of maize, 10 of dried peas, 23 of fresh peas, and 8 of lentils became infected. Only 1 each of chick-peas and Dolichos and 2 of wheat were contaminated at the end of the experiment.

Influence of continued electric currents on the growth of plants, F. KÜVESSI (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 5, pp. 289-291).—The author reports experiments with wheat, supplemented by observations on rye, oats, barley, vetch, beans, various grasses, and a number of species of trees, as well as mosses, algae, and various fungi.

The results obtained confirmed the conclusions of previous investigators that a continued electric current exerts a retarding effect on growth and is decidedly injurious to the germination of seed and the development of plants. The factors which determine the effect of electricity on plants are summarized, and it is shown that the intensity and potential of the current, the conductivity of the medium, and the various physical and biological factors which influence the life of the plant, as well as the chemical changes which take place, all exert an important rôle in plant growth as influenced by electricity.

The liberation of heat in respiration, G. J. PEIRCE (*Bot. Gaz.*, 53 (1912), No. 2, pp. 89-112, *dgms.* 8).—In a previous note (*E. S. R.*, 20, p. 734), the author gives a description of the value of Dewar flasks as respiration calorimeters for class use. Subsequent studies have confirmed their usefulness in physiological experiments. In the present paper an account is given of their use in germination studies with peas, and also of a study on the heat liberated by a mouse placed in a flask.

In the series of experiments with peas, seeds of different ages were germinated in the flasks. It was found that the amount of heat liberated by germinating peas decreased with their age, and apparently that the amount of heat liberated during germination may be used as an index of the age or freshness of seed.

Discussing the significance of heat liberation in respiration, the author calls attention to the fact that there is a much greater release of energy in the form of heat than can possibly be used by the organism, and states that it is evident

that if liberation of heat is the essential result of respiration, respiration must be an excessively wasteful process. He does not believe that respiration is primarily carried on for the purpose of furnishing the living organism with energy in the form of heat, as is often taught. He states that "the liberation of heat may be used, like carbon dioxide, by the physiologist as a gauge of the activity of respiration, but like carbon dioxide, it must be regarded by him as an end product, a waste, and not the essential product. The essential product of respiration may be energy, but if so, it is that energy which is immediately convertible, and is converted into work by the organism. On the other hand, respiration may be essentially a process of purification, in which useless or injurious substances are converted into forms which can be eliminated."

In conclusion he says: "In this study of heat liberation, therefore, I believe I have been occupied with an unessential, although inevitable, feature of the process of respiration. The essential part of the process of respiration is much more likely to be found to be chemical and not physical."

Incipient drying in plants, B. E. LIVINGSTON (*Abstr. in Science, n. ser.*, 35 (1912), No. 897, pp. 394, 395).—Attention is called to the fact that when water loss from the exposed membranes of leaves occurs at a higher rate than that at which water of imbibition enters these membranes the surfaces begin to dry. This phenomenon, which the author terms incipient drying, is said to occur in leaves which are subjected to relatively high transpiration. The drying acts as an automatic check upon transpiration.

The water balance of desert plants, D. T. MACDUGAL (*Ann. Bot. [London]*, 26 (1912), No. 101, pp. 71-93, pls. 5).—In continuation of previous accounts (*E. S. R.*, 26, p. 530), the author describes experiments with *Echinocactus*, *Carnegiea*, *Opuntia*, *Ibervillea*, *Dioscorea*, *Brodiaea*, and other plants and discusses the physiological value of the water balances of the plants studied.

He states that the actual physiological value of water balances varies widely, as shown by his experiments with the different plants. All showed a high rate of water loss immediately upon removal from the soil, after which the curve of transpiration fell. In some instances the plants remained alive for a number of years.

The relation of soil acidity to plant societies, A. W. SAMPSON (*Abstr. in Science, n. ser.*, 35 (1912), No. 898, p. 436).—This is an abstract of a paper presented before the Botanical Society of Washington in February, 1912, which reports a study on the relation of soil acidity to plant cover based on range vegetation observations made in the Wallowa Mountains of northeastern Oregon.

It is stated that "the Leguminosae are commonly extremely sensitive to acid soils, while many Ericaceae species are rather closely confined to acid soils. For example, *Trifolium repens* fails in soils requiring for neutralization the relatively small amount, locally, of 5,000 lbs. of lime per acre-foot, while no species of *Vaccinium* is known that can be grown successfully in neutral or alkaline soils. Again, some genera (e. g., *Populus* and *Rosa*) are apparently indifferent as regards soil preferences. The preeminent forage plant of the Wallowa Mountains, *Festuca viridula*, varies very widely in adaptability to acidity. The soils on which it grows luxuriantly vary in lime requirements from 5,000 to 41,000 lbs. per acre-foot. The 4 species of *Poa* and the 2 species of *Agropyron* occurring locally reach their best development on calcareous and neutral soils."

The weeds of arable land in relation to the soils on which they grow, II, WINIFRED E. BRENCHELEY (*Ann. Bot. [London]*, 26 (1912), No. 101, pp. 95-109).—A study of 106 species of weeds to determine whether definite associations exist

between species of weeds and the soils on which they grow is reported (E. S. R., 25, p. 28).

In each district investigated there appears to be a definite association, which may be either local or general. If local the presence of a weed is considered symptomatic of a certain soil, but not exclusively so. If the association is a general one it is believed to indicate that this species is characteristic of a same type of soil in all districts. There was little evidence found to show an association between weeds and certain crops.

Toxic excreta of plants, F. FLETCHER (*Jour. Agr. Sci.*, 4 (1912), No. 3, pp. 245-247, pt. 1).—In a previous publication (E. S. R., 20, p. 521), the author showed an apparent antagonism of sesame to sorghum, the sesame plants not maturing in the presence of the sorghum. The cause of this behavior was attributed to toxic substances secreted by the sorghum roots. Field experiments with maize and sesame have since been carried on in Egypt, and they appear to show the excretion of toxic material by the roots of maize plants.

The injurious influence of tarred roads on neighboring vegetation, L. MANGIN (*Jour. Agr. Prat., n. ser.*, 22 (1911), No. 35, pp. 271-274, figs. 3).—On account of conflicting opinions regarding the effect of tarring roads on neighboring vegetation, a commission has been appointed to consider the injury, if any, to the trees and shrubs in the parks of Paris. A summary of the findings of the commission is given, of which the essential conclusions have been noted elsewhere (E. S. R., 25, p. 128).

Herbage studies, I.—*Lotus corniculatus*, a cyanophoric plant, H. E. and E. F. ARMSTRONG and E. HORTON (*Proc. Roy. Soc. [London], Ser. B*, 84 (1912), No. B 574, pp. 471-484).—Tests have been made of bird's-foot clover (*L. corniculatus*) by means of sodium picrate papers for the presence of hydrogen cyanid. In 1910 the authors concluded that this plant occasionally contained a cyanophoric glucosid and its corresponding enzym. The experiments were repeated in 1911 with specimens of this plant from many regions, and the glucosid and enzym were rarely absent. The experience has led the authors to correlate the appearance in *L. corniculatus* of the cyanophoric glucosid and the attendant enzym with conditions favoring maturity rather than luxuriance of growth.

L. corniculatus major, or *L. uliginosus*, as it is sometimes called, has always proved free from hydrogen cyanid, as have the species *L. tetragonolobus*, *L. siliquosus*, *L. bertholletii*, and *L. jacobaeus*.

The authors request botanists to test *L. corniculatus* by the above method and report their results to them.

Investigations on heredity, W. JOHANNSEN (*Fortschr. Naturw. Forsch.*, 3 (1911), pp. 71-136, figs. 27).—This is a discussion of heredity as it applies to descent and segregation among plants and animals. A considerable bibliography of the subject is given.

On the cause of dimorphism in *Oenothera nanella*, H. H. ZEIJLSTRA (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci.*, 13 (1911), pt. 2, pp. 680-685, pt. 1).—The author for a number of years has been investigating the dimorphism of *O. nanella*, one of the forms which is said to have arisen by mutation from *O. lamarckiana*. A large number of plants of this species have been studied, and the author has come to the conclusion that *O. nanella* is quite constant in its appearance when grown from seed.

In 1905 among these specimens dwarf plants were frequently observed, and a study of them showed in the stems blackened masses, which were found to be made up of *Micrococcus*. This bacterium is believed to be the agent causing the malformation.

Contribution to the study of buds, PERRIAZ (*Bul. Soc. Vaud. Sci. Nat.*, 5. ser., 46 (1910), No. 170, pp. 445-458, figs. 7).—Anatomical and biological

studies were made of buds of a number of trees, and the author reports that 2 distinct bud forms should be recognized. In the first the bud scales are attached uniformly at the base of the bud, and fall when the young leaves have begun their development. This is true in the case of the ash, horse chestnut, maple, and apple, and the scales function only as protective organs. In the second series the bud scales are arranged in spiral order, and as examples of this the author cites ampelopsis, horn bean, beech, and hazel. In these during the course of their development the scales become modified, develop some chlorophyll, and have the function of young leaves. They fall later, only after the development of the branch and expansion of the true leaves.

Graft hybrids. R. P. GREGORY (*Gard. Chron.*, 3. ser., 50 (1911), Nos. 1288, pp. 161-163, figs. 3; 1289, pp. 185, 186, fig. 1).—A description is given of the graft hybrids *Solanum tubigenae*, *Cytisus adami*, and *Cratogeomys asniensis*, and their origin as shown by the investigations of Winkler, Heuer, Baur, and others is discussed.

International catalogue of scientific literature. M.—Botany (*Internat. Cat. Sci. Lit.*, 9 (1911), pp. VIII+859).—This gives a bibliography of botanical literature, most of which appeared in the years 1907-1909, 6,314 references being included. The American literature is much more adequately represented in the present volume than in the previous ones.

FIELD CROPS.

Classification of field crop varieties. F. MERKEL (*Mitt. Deut. Landw. Gesell.*, 26 (1911), No. 13, pp. 162-166).—The author classifies German varieties of field crops in accordance with their adaptation to special uses. Potatoes, for instance, are divided into groups of varieties high in yield of tubers, high in starch content, and high in total starch yield. The article deals with wheat, barley, mangels, sugar beets, potatoes, grasses, clover, and various legumes.

[**Wisconsin farm crops experiments**], H. L. RUSSELL (*Wisconsin Sta. Bul.*, 218, pp. 15-20, figs. 3).—At the Ashland substation, the pedigree strains of Green peas yielded at the rate of 50 bu. per acre and of Kharkov winter wheat over 45 bu. per acre.

Western alfalfa seed grown in the latitude of Madison, Wis., proved entirely satisfactory and work done indicates that the vitality of the seed is more important than the variety sown. In soy bean work the number of pods per plant ranged from 30 to over 400.

Tests of commercial bacterial cultures showed "that while in some instances satisfactory inoculation has been secured, they are frequently unreliable, and fail to produce nodules upon the roots of the respective legumes, while inoculation with infected soil has been uniformly successful."

The growing of hemp aided in checking the growth of Canada thistles and quack grass. A $\frac{3}{4}$ -acre field infested with quack grass and Canada thistles was heavily manured, plowed in July, harrowed weekly, and the loose roots removed with a hay rake. A hemp crop sown at the rate of 1 bu. per acre the following spring yielded over 2,100 lbs. of fiber per acre, valued at \$118, and "resulted in complete destruction of thistles, and nearly complete annihilation of quack grass."

A solution of 125 lbs. of common salt in 50 gal. of water proved as effective as a 20 per cent iron sulphate solution for the eradication of mustard. The salt is more easily obtained than, and costs about half as much as, the iron sulphate.

Results of cooperative experiments in agriculture. C. A. ZAVITZ and W. J. SQUIRAEL (*Ann. Rpt. Ontario Agr. and Expt. Union*, 32 (1910), pp. 14-37).—

These pages report the results of cooperative tests conducted in Ontario during 1910. The work included variety tests of oats, six-rowed, two-rowed, and hull-less barley, spring and winter wheat, buckwheat, field peas, soy beans, emmer, spelt, mangels, sugar beets, Swedish and fall turnips, carrots, sweet, fodder, and silage corn, millet, sorghum, grass peas, vetches, rape, kale, field cabbage, clover, alfalfa, grasses, field beans, early, medium-ripening, and late potatoes, and winter rye. Fertilizer tests with oats, winter wheat, fodder corn, mangels, Swedish turnips, and potatoes involved the use of nitrate of soda, muriate of potash, superphosphate, and a complete fertilizer, while cow manure also was used with winter wheat, Swedish turnips, and potatoes. These tests covered periods varying from 4 to 8 years. A table states the average results reported from 5 tests of nitrate of soda, muriate of potash, superphosphate, lime, and cow manure singly or in various mixtures in 1910 for barley.

[Fertilizer tests on swamp soils], R. HARCOURT (*Ann. Rpt. Ontario Agr. and Expt. Union*, 32 (1910), pp. 44, 45).—Applications of (1) acid phosphate and sulphate of ammonia, and (2) acid phosphate, sulphate of ammonia, and sulphate of potash were followed by yields of 96 and 176 bu. of potatoes, respectively, as compared with 96 bu. per acre on the check plot. The tests were conducted on swamp soils.

[Adaptation experiments], J. H. HAMPTON (*Rhodesia Agr. Jour.*, 8 (1911), No. 6, pp. 353-362; 9 (1911), No. 1, pp. 16-23, pls. 4).—These articles state briefly the results of tests conducted to determine whether certain crops could be profitably grown under southern Rhodesian conditions. The crops tested were alfalfa, Egyptian clover, velvet beans, cowpeas, lupines, peanuts, sweet potatoes, wheat, oats, millet, flax, mangels, sugar beets, swedes, kohlrabi, carrots, rape, beans, peas, *Paspalum dilatatum*, *Phalaris bulbosa*, and sheep burnet (*Sanguisorba minor*).

[Fertilizer and variety tests], J. JONSTON (*Dept. Agr. Brit. East Africa Ann. Rpt. 1910-11*, pp. 133-160).—These pages report the results obtained in fertilizer, variety, and other tests with alfalfa, rape, corn, beans, wheat, mangels, sugar beets, peas, potatoes, barley, *Paspalum dilatatum*, and flax.

Supplementary pasture crops, M. L. FISHER and F. G. KING (*Indiana Sta. Circ.* 35, pp. 16, fig. 1).—A general discussion of forage crops for the hog is followed by special suggestions on growing for this purpose rape, cowpeas, soy beans, Canada peas and oats, rye, oats, vetches, crimson clover, sorghum, artichokes, mangels, sugar beets, carrots, and pumpkins.

Tables suggest crops suitable for planting during each month from April to October, information for use in planting each of a number of crops, and crop successions for "hogging down" in Indiana.

[Chemical and physical observations on Eritrea cereals], O. MANETTI (*Agr. Colon. [Italy]*, 5 (1911), No. 3, pp. 100-113).—The crops dealt with are *Sorghum vulgare*, *Eleusine coracana*, *Eragrostis abyssinica*, and *Pennisetum spicatum*. Tables state data gathered in observations of the color, purity, germination, chemical composition, and specific gravity of the seed.

Trials with grains and legumes for feeding purposes, 1899-1908, F. HANSEN (*Tidsskr. Landbr. Plantevet.*, 18 (1911), No. 4, pp. 435-542).—The results of trials at 6 Danish experiment stations indicated that for feeding purposes it is generally better to sow a mixture of 100 lbs. oats, 50 lbs. two-rowed barley, 75 lbs. Glänö peas, and 25 lbs. vetches than to sow only a single crop.

Barley alone or mixtures in which barley predominated gave the highest yields on the best soils, while oats or mixtures consisting largely of oats yielded best on the poorer soils.

Eighteen years' culture trials with root crops, L. HELWEG (*Tidsskr. Landbr. Plantævel.*, 18 (1911), No. 5, pp. 645-678, figs. 2).—This report covers cultural tests with mangels, swedes, turnips, and carrots conducted during the period 1906-1910 on 68 different farms (151 experimental fields) in northern and western Jutland, and supplements earlier reports for the period 1893-1905.

The average results for the entire 18 years show that the yield of dry matter was somewhat larger for swedes than for mangels (83.4 and 80.8 cwt. per tøndeland, or 61.2 and 59.3 cwt. per acre, respectively), about 25 per cent less for carrots than for mangels, and about 20 per cent less for turnips than for swedes. The special conditions under which the various crops are to be preferred for different sections of the country are discussed, and a rotation intended to guard against insects and fungus diseases is suggested.

The agave, F. MICHOTTE (*Agr. Prat. Pays Chauds*, 12 (1913), Nos. 106, pp. 1-15; 107, pp. 150-162, figs. 2).—A botanical study of the plant and description of its more important characteristics is followed by directions for its propagation and culture, and a statement of its climatic requirements and the results of a chemical analysis.

Soils of the prairie regions of Alabama and Mississippi and their use for alfalfa (*U. S. Dept. Agr. Rpt.* 96, pp. 48, pls. 7, figs. 4).—This report consists of 2 parts.

I. *Houston clay and associated soils*, H. H. BENNETT (pp. 5-31).—A previous discussion of the Houston clay has been previously noted (*E. S. R.*, 28, p. 517). The author discusses Houston chalk, Houston loam, and Trinity clay as soils associated with and closely related to the Houston clay. As soils associated with but not closely related to the Houston and Trinity soils he discusses Oktibbeha, Susquehanna, Orangeburg, stream bottom soils associated with Trinity clay, Ocklocknee, and Bibb soils.

* II. *Alfalfa on the Houston clay: Its culture and management*, M. A. CROSBY (pp. 32-48).—In view of the fact that alfalfa growing is increasing in importance on the Houston clay soils of Alabama and Mississippi, and that climatic and soil conditions here differ from those of other alfalfa sections, the author gives directions for alfalfa production in this region. Special consideration is given to alfalfa on Johnson grass land and on Bermuda sod.

How to grow alfalfa, A. T. WIANCKO and M. L. FISHER (*Indiana Sta. Circ.* 36, pp. 16, figs. 8).—This is in part a reprint of a circular dealing with the production and use of alfalfa in Indiana already noted (*E. S. R.*, 25, p. 440).

On June 2, 1908, a cutting of 285 lbs. of hay was secured from a plot sown on the thirtieth of the previous July, as compared with 315 lbs. from a plot sown August 10, and 135 lbs. and 11 lbs. respectively, from sowings made August 24 and September 12. Of 269 successful alfalfa growers, 196 regarded a nurse crop as unnecessary while 73 favored it.

Genetic studies with the beet, B. KAJANUS (*Ztschr. Induktive Abstam. u. Vererbungslehre*, 6 (1912), No. 3, pp. 137-179, pls. 9, figs. 2).—The author states briefly the results of each of a considerable number of hybridizations in which he used beets of different varieties. The notes given deal particularly with the size, shape, and color of the roots and leaves.

A new plant fiber, A. ZIMMERMANN (*Pflanzer*, 7 (1911), No. 4, p. 231).—The author reports tests of the fine silky hairs from the seeds of a plant determined as *Chlorocodon whitei*. It was found in German East Africa and further experiments in its production have been taken up there.

Local fertilizer experiments with cotton in South Alabama in 1911, J. F. DUGGAS, J. T. WILLIAMSON, L. L. GLOVER, and E. HODSON (*Alabama Col. Sta. Bul.* 160, pp. 241-296).—The results of local fertilizer experiments or soil tests

conducted "to ascertain the best fertilizers or combination of fertilizers for cotton growing on each of the principal soils of the southern half of Alabama" are reported. The applications used and the yields and financial returns obtained on a considerable number of farms are summarized, but no general conclusions are drawn.

Local fertilizer experiments with cotton in North Alabama in 1911, J. F. DUGGAR, J. T. WILLIAMSON, L. L. GLOVER, and E. HOPSON (*Alabama Col. Sta. Bul. 162, pp. 56*).—This bulletin is similar to the above, except that it presents studies made in the northern half of Alabama. No general conclusions are drawn.

Cotton culture in North Carolina (*Bul. N. C. Dept. Agr., 33 (1912), No. 2, pp. 36, fig. 1*).—Discussions of the botanical relations of the cotton plant and of the soil, cultural, and other problems connected with its production in North Carolina are followed by tables stating the results of variety tests conducted in 10 different localities in the State. In most instances the yields reported are for 1911, but some of the tables cover the period 1901-1911.

Heading off boll weevil panic, W. E. HINDS (*Alabama Col. Sta. Bul. 159, pp. 225-238, fig. 1*).—A continuation of a previous discussion (*E. S. R., 23, p. 55*).

A map shows the Alabama weevil line of 1911, including 5 counties and portions of 7 others, and the quarantined area. A review of the boll weevil situation is followed by suggestions to bankers, cotton factors, merchants, and others relative to loans or advances as affected by the boll weevil. It is believed that in most cases loans may continue to be made with safety to the limit of from 50 to 75 per cent of what might be advanced if the boll weevil were not present, provided the grower will so reduce his acreage as to ensure the best of care and will provide for diversification of crops.

Tables showing the acreage devoted to cotton in several States and the average yield secured during certain years since 1894 present data which may be summed up in the following table:

Effect of weevil infestation on cotton acreage and yield per acre.

Year.	Acreage.				Bales per acre.				Percentage of weevil infestation.			
	Ala.	Miss.	La.	Tex.	Ala.	Miss.	La.	Tex.	Ala.	Miss.	La.	Tex.
1894....	2,664,861	2,826,272	1,313,296	6,854,621	0.337	0.435	0.579	0.458	0	0	0	0.25
1898....	3,003,176	2,900,298	1,281,691	6,991,904	.391	.429	.560	.481	0	0	0	11.00
1902....	3,501,614	3,183,989	1,617,536	7,640,531	.279	.455	.548	.326	0	0	0	34.50
1906....	3,658,000	3,408,000	1,739,000	8,894,000	.345	.446	.563	.457	0	0	23.00	71.00
1909....	3,471,000	3,231,000	930,000	9,690,000	.307	.337	.290	.264	0	0.00	100.00	80.00
1910....	3,560,000	3,317,000	975,000	10,650,000	.343	.377	.263	.305	0	14.00	100.00	82.00

British cotton growing, J. H. REEN (*Jour. Manchester Geogr. Soc., 26 (1910), No. 4, pp. 179-197, pls. 6*).—The author predicts that unless cotton supplies are obtained from fields other than those of America, the Lancashire industry will completely perish. The British demand for raw cotton is slightly less to-day than it was 25 years ago, but that of other countries has gradually increased. Between 1892 and 1910 the British demand decreased 4 per cent, while that of continental Europe increased 70 per cent and that of the United States 90 per cent. In view of these conditions the author discusses the possibility of increasing the cotton production of India, Egypt, and other British territory.

Seed selection series. I, Broach cotton, T. F. MAIN (*Dept. Agr. Bombay Bul.* 46, 1911, pp. 3, pls. 5).—A description of the ideal broach cotton plant and directions for field selection are accompanied by photographs illustrating the characters to be sought or avoided in obtaining plants of the proper habits and fiber of sufficient length for high-ginning qualities.

Sakellaridis cotton (*Bul. Imp. Inst. [So. Kensington]*, 9 (1911), No. 3, p. 288).—This article reports the discovery of a new type of cotton in Egypt by Sakellaridis. It matured earlier than Mitaffi, but flourishes in the same districts and in districts which are not suitable for Yannovitch. The fiber is soft, silky, cream-colored with reddish tinge, of good strength, and from 1.4 to 1.7 in. in length. Experts valued it at 14½ cts. per pound as compared with "fine" Yannovitch at 13½ cts. per pound.

[Cotton tests at the botanical garden of Palermo], A. Bozzi (*Bol. Min. Agr., Indus. e Com. [Rome]*, Ser. C, 10 (1911), No. 5, pp. 1-5).—The author reports the results of variety tests of tree, Bulgarian, Mitaffi, and American cottons, and hybrids of Trahut and of the colonial or botanical garden of Palermo.

Tests indicated that irrigation aided the development of the plant, but delayed the maturity of the bolls. The drought resistance of the plants leads the author to predict a great extension of cotton culture.

Fertilizing ingredients in Danish hay crops, R. K. KRISTENSEN (*Tidsskr. Landbr. Planteavl*, 18 (1911), No. 4, pp. 543-569).—Chemical analyses are reported showing the nitrogen, phosphoric acid, and potash contents of timothy, rye grass, white, red, and alsike clovers, and of other grasses and legumes grown at the Danish Experiment Station at Askov during the period 1905-1909. The material was obtained from the experiments with hay crops grown under different systems of fertilization on clay, sand, and marsh soils.

A note on onion couch, L. M. UNDERWOOD (*Jour. Agr. Sci.*, 4 (1912), No. 3, pp. 270-272, figs. 4).—The author notes the difference of opinion as to whether the bulbous form of *Arrhenatherum arenaceum* is entitled to specific rank and states the results of pot tests conducted on various soils and under different moisture conditions. From these tests, he concludes "that the habit of forming bulbs is hereditary and does not depend on the conditions of the habitat. Other than the bulbs, no differences in habit were noted between the 2 plants."

Potatoes at Wisley, 1911 (*Jour. Roy. Hort. Soc. [London]*, 37 (1912), No. 3, pp. 569-575).—Brief descriptions are given of each of more than 70 varieties of potatoes tested.

Six years' potato variety tests at Sindlingen, R. ADLUNG (*Württemb. Wchnbl. Landw.*, 1912, No. 10, pp. 164-166).—A table states the yields of tubers and starch obtained during each year of the period 1906-1911 in a test of 34 varieties.

A new potato (*Bul. Union Cent. Synd. Agr. France*, 1910, Nov. 1, p. 341; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 1910, No. 2, p. 248).—This article discusses a potato variety said to be resistant to attacks of *Phytophthora infestans*. It is stated that the plants reach a height of 2.43 meters.

The thornless prickly pears, D. GRIFFITHS (*U. S. Dept. Agr., Farmers' Bul.* 483, pp. 20, figs. 4).—A statement of the geographical distribution of thornless prickly pears and their moisture, temperature, and soil requirements accompanies directions for propagating, planting, cultivating, harvesting the crop, and transporting the cuttings. Other topics discussed are varieties, the botanical status of thornless prickly pears, and the stability of the spineless character.

[Advice on prickly pear destruction] (*Queensland Bd. Advice Prickly Pear Destruc., Interim Rpt. 1, 1911, pp. 19*).—This report, presented to the houses of Parliament of Queensland, deals with the destruction of the prickly pear by such mechanical means as stacking, burning, rolling, and plowing in, by poisoning with or without subsequent burning, by diseases or insect enemies, and by nitrification as fodder or in other ways.

San hemp (*Crotalaria juncea*), P. C. PATIL (*Dept. Agr. Bombay Bul. 47, 1911, pp. 9*).—A botanical description of the plant and statement of its uses is followed by suggestions for growing the crop and retting it.

Grain-sorghum production in the San Antonio region of Texas, C. R. BALL and S. H. HASTINGS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 237, pp. 39, figs. 4*).—The San Antonio region of Texas is adapted to the production of grain sorghums, but they have failed to set seed. This condition, known as "blast," has been attributed to the removal of pollen by heavy rains during the blooming period. The authors report experiments during which it was discovered that this trouble was caused by the sorghum midge (*Contarinia (Diplosia) sorghicola*). They also describe attempts to find resistant varieties and state the results of experiments indicating the possibility of avoiding the work of midges by early planting.

Life history studies supplemented by those of Dean (*E. S. R., 23, p. 364*) are reported. "More than 1,000 [midges] have been hatched from a single head of sorghum. Observations and experiments in 1908 and 1909 failed to find midge-resistant sorghums in any group." In 1910, early planting experiments indicated that the crop could be brought to the blooming stage before the midge was present in sufficient numbers to be very injurious. In 1911, the average yield of all varieties planted March 4 was 23.1 bu., and of the best early variety 32 bu. per acre. Corn on similar land in the same season yielded an average of 10 bu. per acre. Planting as late as April 1 proved unprofitable because of midge injury and drought, but when planted March 15 early varieties yielded very well, while later varieties yielded more poorly. Milo and Dwarf milo maize, Manchu Kowliang, and White durra are the earliest varieties. Sudan durra and Dwarf Kafir corn are also promising.

The authors recommend the destruction of Johnson grass and sorghum plants in fence corners and waste places, in order that fewer midges may survive the winter and that the succeeding crops may be more likely to flower without infestation. In view of the results of experiments they also recommend fall plowing for conserving moisture and state that for prompt and uniform germination a thoroughly prepared seed bed is essential. Kowliangs should be planted 5 to 6 in. apart in rows 3½ feet apart, milo maize and durras from 6 to 8 in. apart, and Kafir corn from 8 to 10 in. apart. The date of planting should be as near March 1 as possible, as the risk from late spring frosts is more than compensated by avoiding the midge and drought injury.

Observations on the early flowering of the sugar beet, O. MUNERATI (*Maliophia, 2½ (1911), No. 2, pp. 173-187*).—Sowings of 6 varieties of sugar beets at intervals from November 14 to June 15 indicated a decisive effect of the time of sowing on the tendency to premature flowering, but no relation between the number of plants flowering the first year and the yield secured.

Of the beets sown November 15 and December 23, 55 and 65 per cent, respectively, flowered during the first season, but after that time the percentage decreased steadily until of those sown March 14 only about 1 per cent flowered, and of those sown April 26 or later none flowered the first season. The composition of the large, medium, and small beets, as shown by analyses, is reported in tabular form.

Sweet clover, J. M. WESTGATE and H. N. VINALL (*U. S. Dept. Agr., Farmers' Bul. 485, pp. 39, Figs. 16*).—This discusses the various species of sweet clover, outlines its status in various sections of the United States, and gives directions for growing, cutting, and curing the crop. Its uses for hay, in rotation as a soiling crop, and as a soil improver are summarized, and directions are given for seed production and for the eradication of the crop when it becomes a weed. White sweet clover (*Mellilotus alba*) is the species principally discussed, but the yellow annual and biennial species (*M. indica*) and (*M. officinalis*) are briefly treated. An outline map of the United States shows that localities in 22 States are successfully utilizing sweet clover as a forage crop.

The ordinary slow germination due to hard seed may be overcome by soaking the seed in concentrated commercial sulphuric acid just before sowing and washing rapidly in an abundance of water with frequent changes. Tests of this method gave an increase in germination of from 40 to 45 per cent. Southern grown seed is about 60 per cent, northern grown 43 per cent, and imported seed about 12 per cent hard. The presence of this hard seed, which does not usually germinate the first season, may enable sweet clover to continue in a meadow a number of years without reseeding.

Its habits of growth do not make sweet clover troublesome under ordinary conditions. Its control is especially difficult only under irrigation conditions where old plants along ditch banks furnish seed which is scattered each year by the irrigation water.

The culture of cigar leaf tobacco in Texas, O. OLSON (*Texas Sta. Bul. 144, pp. 3-42, Figs. 11*).—A summary of previous tobacco work in Texas carried on by this Department and general information on the production, harvesting, and curing of cigar-leaf tobacco in Texas are followed by statements of work on a tobacco demonstration plat and of the results of experimental work.

The cost of cigar-filler tobacco to the buyer or packer is reported as approximately 25 cts. per pound, including the items of 15 cts. for barn-cured tobacco, 3 cts. for loss in weight during fermentation, 1 ct. for fermentation, 3 cts. for assorting, sizing, and tying, 1 ct. for baling, and 2 cts. for rent, supervision, etc. The total cost per 1,000 cigars for Texas Cuban filler tobacco, and the necessary binders and wrappers is estimated at about \$15.25. The cost per acre of growing, stripping, and tying is estimated at \$78.

The author states in detail the methods used and results obtained in rotations in fertilizer tests with tobacco, from which he concludes that the average yields of 500 lbs. of Texas Cuban and 800 lbs. of Big Cuban can be increased to at least 1,000 and 1,300 lbs. per acre respectively. In addition to the low yield secured from the check and no-nitrogen plats, the leaves were generally "thin and papery, while the laboratory tests indicated less aroma and flavor and much less ability to stand a heavy fermentation than the tobacco from the highly fertilized plats." Potash alone did not prove conducive to a good yield, although a tobacco grown after its use ranked very high in aroma, flavor, and burn. Phosphoric acid caused a rapid and highly desirable growth, and the author recommends the use of 16 per cent acid phosphate. The methods used in the seed beds are briefly stated, and a table gives the grades awarded the tobacco grown on each of 12 fertilizer plats, in accordance with score card points.

Notes are given on the varieties and types grown on the variety and breeding plats.

Cultural tests of Herzegovina tobacco in Italy, ARBATE (*Bol. Tec. Coltiv. Tabacchi [Scafati], 10 (1911), No. 3, pp. 161-164*).—These experiments were conducted in Comiso, Italy, on soils of different types.

Water content of soil and nitrogen fertilization in relation to the development of Göttingen bearded square-head winter wheat in different vegetation periods, K. MEYER (*Ueber den Einfluss verschieden hohen Wassergehalts des Bodens in den einzelnen Vegetationsstadien bei verschiedener N-Düngung auf die Entwicklung des Göttinger begrannten Squarehead-Winterweizens. Inaug. Diss., Univ. Göttingen, 1908, pp. 90, pls. 3*).—These tests were conducted in zinc pots 33 cm. high and 25 cm. in diameter. Each contained 20 kg. of soil to which had been added 1 gm. of potash in potassium carbonate and 1 gm. of phosphoric acid in monocalcium phosphate. To some 1.5 gm. of nitrogen in nitrate of soda was added, and to others only 0.5 gm. of nitrogen. The water content of the soil was maintained at 45 per cent of its absolute water-holding capacity during the first vegetation period, and at 70 per cent during the rest of the test. In other cases this order was reversed.

From the data presented the author draws the following conclusions: The water consumed is less in case of high nitrogen fertilization, and high water content of the soil markedly increases the total yield only in case much nitrogen is present. The ratio of grain to straw is reduced by the presence of a large amount of moisture if plant food is not present in sufficient quantity. Grain formation is favored by an increase in the amount of water present during the last vegetation period.

Tillering is influenced by nitrogen fertilization and the amount of water present. The weight of the roots is increased by nitrogen fertilization and by an increase in the amount of water present, but the same root mass will produce more grain and straw on a fertile soil than on a thin soil. The total length of haulm depends generally on the water content of the soil during shooting. Tillering is unfavorable to length of haulm only when the soil is deficient in plant food. Potash fertilization does not determine the relative length of internodes and haulms. The length of the upper internode is influenced by the water content of the soil, particularly at the time of shooting, while the length of the lower internodes depends on the water content during the first vegetation period. Abundant fertilization and soil moisture increase the strength of the straw and weight of head. Tillering reduces strength of straw and weight of head only when accompanied by lack of plant food. The water supply during the first vegetation period governs the length of head and the number of kernels per head. Barren spikelets result from unfavorable water and food conditions. Increased moisture at the time of shooting gave the lowest number of barren spikelets in the case of high nitrogen fertilization.

Nitrogen fertilization rather than the water content of the soil appeared to be of importance in determining the number of blossoms per spikelet; it also favored symmetry of head. The less nitrogen there is available the more the soil moisture influences symmetry of head. In case of change in the amount of water, only a high moisture content during the first period exerted an unfavorable influence on the symmetry of head.

Other things being equal, the length of beard increased with length of head. Insufficient moisture during the first vegetation produced long beards, but much moisture produced a weak development of beard. There appeared to be no constant relation between length of beard and weight of grain. The longest beards appeared higher on the head than did the heaviest kernels.

With low nitrogen fertilization the heaviest kernels appeared in the lower portion of the ear, while high nitrogen fertilization apparently resulted in a tendency for the heavy kernels to appear at the middle of the head. The 1,000-kernel weight varied with the soil moisture in case of the heavier application of nitrogen. Plant food was low if much moisture was applied at an

early stage to the pots with only 0.5 gm. of nitrogen. Excessively high nitrogen fertilization with continued droughts reduced the 1,000-kernel weight.

By grouping the haulms and heads with reference to fertilization and the amount of water supplied the author obtained quite regularly graded series of data on length, weight, fruitfulness of head, and 1,000-kernel weight. The regularity of this gradation was also maintained in case of the number of kernels per head when much water was supplied during the first vegetation period.

Report of the Danish seed control station, 1910-11, K. DORPH-PETERSEN (*Tidsskr. Landbr. Planteavl*, 18 (1911), No. 5, pp. 673-718).—These pages summarize the results of purity and germination tests, made during the period 1901-1911, of 9,024 samples of seeds of 32 species of clovers, grasses, root crops, and small grains. The frequency of occurrence of various weed seeds is stated. [Tests of Bombay seeds], I. G. D. MEHTA (*Dept. Agr. Bombay Bul.* 49, 1911, pp. 27).—The results of analyses and germination tests of seeds commonly grown in the Ahmednagar district of Bombay are reported.

HORTICULTURE.

Report on the government horticultural gardens, Lucknow, for the year ended March 31, 1911, H. J. DAVIES (*Rpt. Govt. Hort. Gardens Lucknow*, 1911, pp. 8).—A progress report discussing administrative affairs, conditions of the gardens, character of the season, acclimatization and other experiments, financial results, and miscellaneous work.

Report of the fruit branch of the department of agriculture, Ontario, 1910, P. W. HODGETTS ET AL. (*Rpt. Fruit Branch Dept. Agr. Ontario*, 1910, pp. 167, figs. 41).—This report contains a general survey of the work of the fruit growers' and bee-keepers' associations, the experimental fruit stations, nursery inspection, and orchard surveys, together with other cooperative and miscellaneous work of the year.

Return of inspections of fruit and vegetables for year ended June 30, 1911, E. G. E. SCAVEN (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1910-11, p. 10).—A statistical review of the export and import fruit and vegetable trade of Queensland.

Spraying to control the important insects and fungus diseases affecting the fruit and foliage of the apple, W. M. SCOTT (*Thomsen Chem. Co. Circ.* 4, 1912, pp. 26, pls. 4).—A practical treatise based largely upon the results secured from the work of this Department and the State experiment stations.

Orchard spray calendar, M. W. RICHARDS (*Indiana Sta. Circ.* 34, pp. 12, figs. 12).—This circular contains a complete spraying schedule for orchard fruits, with recommended formulas for preparing the materials and the approximate time of application for those which are most important and most generally used.

Lime-sulphur wash, L. CAESAR (*Ontario Dept. Agr. Bul.* 198, 1912, pp. 44, figs. 28).—This bulletin summarizes the results of the latest investigations and experiments in making lime-sulphur wash and the various uses to which it can be applied.

Valencia melon industry, R. FRAZER, JR. (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 106, pp. 474, 475).—An account is given of the winter melons grown in the Valencia district, with reference to varieties, methods of planting, and seed selection.

Onions, A. McMEANS (*Ontario Dept. Agr. Bul.* 199, 1912, pp. 24, figs. 14).—A reprint of a survey of the onion industry in Ontario, Michigan, Indiana, Illinois, and Ohio, previously noted (*E. S. R.*, 21, p. 236).

The pear and how to grow it, G. B. BRACKETT (*U. S. Dept. Agr., Farmers' Bul.* 482, pp. 31, figs. 30).—This is a popular treatise on pear culture based on practical experience.

The subject matter is discussed under the following general headings: Dwarf and standard trees, propagation, location of the orchard, fertilizers, planting the orchard, selection of trees, cultivation, cover crops, pruning and training, protection from rodents, diseases and insect enemies, thinning the fruit, gathering the fruit, sorting and grading, packages, the fruit room, and disposing of the crop. Abridged descriptions are given of select varieties of pears.

The plums of New York, U. P. HEDRICK ET AL. (*New York State Sta. Rpt.* 1910, pt. 2, pp. XII+616, pls. 100).—This is the third of a series of monographs on the fruits of New York (*E. S. R.*, 20, p. 940). Although the work has a special significance for New York State, its contents are considered sufficiently general to be offered as a record of the present knowledge of cultivated plums and to be applicable to the whole country and more or less to the world.

In the first chapter the history and general characters of plums are discussed; a conspectus showing the relations of the species to each other is given; and each species is described and discussed in detail relative to its literature, botanical characteristics, and varietal groups. Chapter 2 discusses the present status of plum culture in America under the following headings: Climate, the pollination of plums, locations and soils, stocks and propagation, plum orchards and their care, harvesting and marketing, diseases, and insects. A table is given showing the averages of the blooming dates at the New York State Station of varieties of plums for the 8 years 1902 to 1909. Chapter 3 describes the leading varieties of plums. The technical descriptions are for the most part original and the aim has been to give a concise idea of all of the characters of each variety. Synonyms and important references are also given. Chapter 4 contains briefer descriptions of the minor varieties of plums.

The color plates of species and leading varieties are a valuable adjunct to the text. A bibliography is given containing all horticultural books in America dealing with the plum, together with the European books and all periodicals referred to in the volume.

Report on orcharding and the wine industry, H. BRÖNNLE (*Pflanzer*, 7 (1911), No. 12, pp. 722-742).—A report on the development of the fruit and wine industries in German East Africa, including information relative to cultural practices, principal insect pests and diseases, and their control.

Grape culture, E. R. FARRAR (*Agr. of Mass.*, 1910, pp. 151-155).—A short article on commercial grape culture with special reference to Massachusetts conditions.

The family strawberry patch and the way to make it a success, W. BOUTON (*Alpena, Mich.*, [1911], pp. 62).—A popular treatise on this subject.

Roselle, its cultivation and uses, P. J. WESTER (*Philippine Agr. Rev.* [English Ed.], 5 (1912), No. 3, pp. 123-132, pls. 2, fig. 1).—An account of the roselle (*Hibiscus sabdariffa*) relative to its history, botany, and geographical distribution; varieties; soil, planting, and cultivation; harvesting and yield; composition and uses; diseases; and insect pests.

The only disease that has been thus far noted on the roselle is the mildew (*Oidium* sp.), which was found in Florida to attack the plant in the cool, damp fall nights. This is easily controlled by dusting with dry sulphur when the plants are wet with dew.

The Sour orange bud as a remedy for gummosis of citrus trees, L. SAYAS-TANO (*R. Staz. Sper. Agrum. e Frutticol. Actuale*, Bol. 7, 1912, pp. 4, figs. 2).—A popular bulletin, in which the author calls attention to the value of Sour

orange stock for citrus trees which are apt to be attacked by gummosis, and also to the practice of inserting Sour orange buds beneath the wounds of trees already attacked by gummosis. These buds, which are allowed to grow for 2 or 3 years, appear to arrest the disease and the wound becomes callused over.

When the buds become too rank in growth they are removed and the operation is repeated by starting 1 or 2 new Sour orange buds below the wound. This method is of special value for renewing old lemon trees.

° **English walnuts**, W. F. ALLEN (*Lawrenceville, N. J., 1912, pp. 29, pls. 4, figs. 3*).—This comprises a compilation of information relative to planting, cultivating, and harvesting English walnuts.

Making a lawn, L. J. DOOGUE (*New York, 1912, pp. 51, pls. 8*).—A handbook on lawn making, the successive chapters of which discuss the small lawn, old, and new; the treatment of large areas; grass seed; sowing the seed; sodding; good loam and fertilizers; the lawn mower, roller, and hose; and weeds and other pests.

Amateur gardencraft, E. E. REXFORD (*Philadelphia and London, 1912, pp. 300, pls. 34*).—A popular treatise on ornamental gardening.

Consideration is given to making and planting the lawn, shrubs, vines, the hardy border, the garden of annuals, the bulb garden, the rose, the dahlia, the gladiolus, lilies, plants for special purposes, arbors, summer houses, pergolas, and other garden features, together with a memorandum of operations for the year.

Garden profits, E. L. D. SEYMOUR (*Garden City, N. Y., 1911, pp. 245, figs. 57*).—A practical treatise on city and suburban gardening.

One hundred and fifty small gardens, C. HAMPEL (*150 kleine Gärten. Berlin, 1910, 4. enl. ed., pp. IV+202, figs. 150*).—This work contains plans, descriptions, and planting suggestions for 150 small gardens, representing both formal and natural arrangements and combinations of the two.

Let's make a flower garden, HANNA R. VERBECK (*New York, 1912, pp. 203, pls. 31*).—A popular treatise on flower gardening, containing information relative to cultural details, garden arrangement, suitable plants, etc.

Orchids, J. O'BRIEN (*New York [1912], pp. IX+114, pls. 8*).—A popular treatise on orchid culture, including information relative to diseases and insect pests, hybridizing, and raising seedling orchids, and an enumeration of the principal genera and species in cultivation.

Carnations and pinks, T. H. COOK, J. DOUGLAS, and J. F. McLEOD (*New York [1912], pp. IX+116, pls. 3, figs. 2*).—A popular treatise containing historical notes, cultural details, and information relative to different types and varieties of carnations and pinks.

The work concludes with a calendar of operations.

FORESTRY.

The elements of British forestry, J. NISBET (*Edinburgh and London, 1891, pp. XII+345, figs. 92*).—A handbook for forest apprentices and forestry students.

The subject matter is presented under the general headings of silviculture, the management and protection of woodlands, and the utilization of woodland produce.

Forestry for woodmen, C. O. HANSON (*Oxford, Eng., 1911, pp. 222, pls. 12, figs. 15*).—A popular work on scientific forestry, based largely on the important literature on the subject, and prepared especially for practical foresters and woodmen.

The successive chapters discuss the life history of a tree; tree growth in relation to climate and soil; pure and mixed woods; nursery management; sowing and planting in the forest; tending of woods; methods of treatment; protection of woods against destructive animals, birds, and insects, weeds and fungi, and against frost, drought, storms, and fires; silvicultural notes on broad-leaved trees and conifers; fencing and draining; felling and measurement of timber; working plans; and the uses of British timber.

Wood and forest, W. NOYES (*Peoria, Ill., 1912, pp. 369, figs. 140*).—A handbook of information relative to the sources, growth, properties, identification, and uses of the common American woods.

The successive chapters discuss the structure and properties of wood, the principal species of American woods, the distribution and composition of the North American forests, the forest organism, natural enemies of the forest, the exhaustion of the forest, and the use of the forest. Information for distinguishing different woods is appended, also a general bibliography on wood and forestry.

Sixty-six species of American woods are considered relative to their habitat, characteristics of the tree, appearance of wood, physical qualities, and common uses. Illustrations are given in each case of the leaf of the tree and of the radial, tangential, and cross sections of the wood. The woods are also listed in order of their weight, strength, elasticity, and hardness.

On forest types, A. K. CAJANDER (*Fennia; Bul. Soc. Geogr. Finlande, 28 (1909), No. 2, pp. IV+175*).—This comprises a detailed study of the forest flora in a number of German forest districts, conducted principally to determine to what extent a knowledge of plant groups is of value for scientific forestry investigations and for practical forestry. A similar study of the forms in the vicinity of Brixen is appended.

For the region studied the author found that the dominant forest forms fell into a comparatively small number of types, which were readily characterized by certain dominant plants of the ground flora. The forest types were widely distributed and the same type was found to occur at altitudes ranging from 5 meters to 600 meters. The author concludes that the occurrence of a forest type is not exclusively influenced by any one factor, such as the physical and chemical composition of the soil, exposure, altitude, etc., since the same type is found on various soils and exposures. The forest types appear to be much more the result of the total effect of locality factors than as formations which occur on similar biologic localities. The ground vegetation does not appear to be materially influenced by the dominant tree or trees. Each forest type appears to have a special growth energy. The necretion of the same timber species in different types is quite variable, but within the same type there are no great differences. Within one and the same forest type similar regeneration and silvical methods are applicable to the same timber species.

Experiments on the periodicity of some tropical trees, H. DINGLEE (*Stützber. K. Bayer. Akad. Wiss., Math. Phys. Kl., 1911, No. 1, pp. 127-143*).—In order to throw some light on the cause of the normal leaf fall which occurs with many native species in Ceylon during the drought period in March, the author conducted pruning experiments with many of the species growing in the Peradeniya Botanic Garden and Experiment Station and elsewhere.

The results, as here tabulated and discussed, show that if the trees are pruned in the fall the resulting vigorous new leaf growth formed in December passes through the normal leaf-fall period without dropping off. From these results the conclusion is formed that the normal leaf fall of these tropical trees can not be attributed primarily to external conditions of the temperature, moisture, etc., and that measures taken to control the temperature and moisture

conditions will not prevent the normal leaf fall. The cause of the leaf fall, which appears to lie in part at least within the plant, has not been thus far determined.

On the periodicity of central European deciduous trees in the mountain climate of Ceylon, H. DINGLER (*Sitzber. K. Bayer. Akad. Wiss., Math. Phys. Kl.*, 1911, No. 2, pp. 217-247).—In connection with the above investigation the growth performance of a number of deciduous forest and fruit trees, native to Central Europe and growing at Nuwara Eliya and Hakgala in the mountains of Ceylon, was observed.

From the data thus far secured the author is led to conclude that the temperate climate trees, when thus transferred to the tempered tropical mountain climate at the above named places, make 2 growth cycles in a year with little, if any, resting period between. The first cycle commences in spring and ends in fall, at which time the trees recommence their life activities almost immediately, the cycle ending by spring. The leaves from the summer growth are carried over into the late winter, when conditions seem favorable for their falling off without at the same time seriously retarding the development of the new growth.

This continuous growth performance, however, appeared to weaken the reproductive activities of both the forest and fruit trees observed. Many kinds of trees matured their fruit but the yield was much less than in their native land. Vegetative development was greater in a number of cases, as with oaks, pears, cherries, and to a certain degree peaches, and less in other cases, such as the red beech and birch, than in the natural habitat of these trees.

It is stated that no conclusion can be drawn as yet from the information at hand as to the cause of this variation.

The strength, elasticity, and other properties of New South Wales hardwood timbers, W. H. WARAEN (*Sydney: Dept. Forestry, N. S. Wales, 1911, pp. 100, pls. 16, figs. 67*).—This report gives the results of the following tests commenced in 1907 and continued up to December, 1910: Compression tests of cubes to determine any variation in strength of wood growing at different heights above the ground; the strength and elasticity of large and small timber beams; the strength and elasticity of long and short columns subjected to compression; shearing and tensile strength of timber; the holding power of nails and spikes; the compressive strength across the fiber; hardness and torsion tests; resistance to wear in floors and street pavements; impact; and tests of beams. The tests were made on various eucalypts, as well as with the turpentine tree (*Syncarpia laurifolia*), brush box (*Tristania conferta*), and the colonial teak (*Plinderia australis*). The testing methods are fully described and the results are tabulated and further explained by numerous diagrams and illustrations.

A careful consideration of the results obtained from the tests of cubes taken from 5 sections of the tree shows that with the same moisture content present in each case, the timber cut from the highest section is slightly, but not materially, stronger than that cut from the other 4 sections. Each timber was found to have a characteristic strength moisture curve beyond a certain point in which additional moisture does not seriously reduce the strength. Diminution of moisture below this point, on the other hand, produces an important increase in strength, which is much greater in some timbers than in others. The results illustrate the importance of seasoning on the strength of timber and also indicate that certain timbers exposed to the weather may become considerably reduced in strength.

Hevea brasiliensis, G. VERNET (*Bul. Écon. Indo-Chine, n. ser., 14 (1911), Nos. 92, pp. 777-826; 93, pp. 917-944; 15 (1912), No. 94, pp. 40-98, figs. 7*).—

Part 1 of this study treats in detail of the preparation and industrial value of different grades of raw Para rubber. Part 2 deals with the culture and exploitation of Para rubber in the Malayann Peninsula, in Java, and in Ceylon.

On the anatomy of *Hevea brasiliensis* and *Manihot glaziovii* with reference to tapping, P. ARENS (*Meded. Proefstat. Malang, 1911, No. 1, pp. 5-11, figs. 5*).—A short descriptive account.

An irrigation method for tapping *Hevea*, T. WURTH (*Meded. Proefstat. Malang, 1911, No. 1, pp. 15-18, figs. 2*).—A method of providing a small hut constant supply of water to the tapping incisions is described and illustrated.

[Tapping experiments] (*Ann. Rpt. Agr. Dept. South. Nigeria, 1910, pp. 9-14, 34-36, 39*).—Experimental tappings of Ceara and Para rubber trees made at different points in Southern Nigeria are reported.

On the coagulation of the latexes of some *Euphorbias*, A. ZIMMERMANN (*Pflanzer, 7 (1911), No. 12, pp. 742-744*).—The latexes of a number of *Euphorbias* were successfully coagulated with a 1 or 2 per cent solution of tannin.

On heath burning for reforestation, E. WIBECK (*Meddel. Stat. Skogsförskarsnst. (Mitt. Forstl. Vers. Anst. Schwedens), 1911, No. 8, pp. 7-24, figs. 35*).—During the period 1888 to 1893 a number of experimental areas were established in the heath districts of Sweden to determine the best silvicultural methods for these soils, a special study being made of the effect of burning over the lands previous to reforestation. The results secured on these areas are here reported in detail.

The species planted were pine, spruce, and birch. Regardless of soil and cultural methods the pine alone has made good growth. Burning over the land appears to increase the growth in some localities and to check it in others. Generally speaking, deep soils with a medium amount of moisture show the greatest improvement from burning over. Burning during dry periods is apt to cause injurious ground fires. Burning off the vegetation from dry, sandy soils, shallow soils, and wet soils is of doubtful value and may even prove harmful.

From 2 to 3 times as much seed was necessary to secure a stand on unburned land as on burned land.

A new sowing method in the mountains, HAUENSTEIN (*Forstw. Centbl., n. ser., 34 (1912), No. 4, pp. 207-217, figs. 3*).—A hand seed drill for sowing forest seed in rough mountainous lands is described and illustrated.

The Spranz seed sower, SCHINZINGER (*Allg. Forst u. Jagd Ztg., 88 (1912), Apr., p. 143, fig. 1*).—A hand apparatus for broadcasting coniferous seeds is illustrated and described.

Progress report of forest administration in Baluchistan for 1910-11, MULRAJ and H. DOBBS (*Rpt. Forest Admin. Baluchistan, 1910-11, pp. III+34*).—This is the customary report of the forest conservator relative to the constitution, management, exploitation, and administration of the state forests in Baluchistan, including a financial statement for the year 1910-11. The principal data are appended in tabular form. The report is reviewed by the revenue commissioner.

DISEASES OF PLANTS.

Bacteria in relation to plant diseases, II, E. F. SMITH (*Carnegie Inst. Washington Pub. 27, vol. 2, 1911, pp. VIII+363, pls. 20, figs. 148*).—This is in continuation of the author's monograph on the diseases of plants due to bacteria, the first volume of which has been noted elsewhere (*E. S. R., 17, p. 263*). In the first volume the general subject of bacteria and methods of work was discussed, while in the second volume the history of the subject, general considerations, and vascular diseases are treated.

After a very full review of the early literature relating to bacterial diseases of plants, the author takes up and treats of the occurrence of bacteria in plants, methods of their entrance, inception and progress of disease, reaction of the host, individual and varietal resistance, etc. An extended chapter is devoted to the subject of symbiosis, particular attention being given to that occurring between *Bacterium leguminosarum*, or *Pseudomonas radicicola*, and its host plants, the Leguminosae. The author considers the organism in this case a restricted parasite. Other forms of symbiosis are described at some length. The subject of the possibility of the transfer to plants of bacteria known to cause diseases of animals receives attention. The use of germicides in the treatment of seeds and dormant and growing plants is discussed and formulas for numerous fungicides and insecticides are given.

In the second part of the volume the author begins the consideration of specific diseases. Plant diseases due to bacteria are classified by him into 3 groups, vascular diseases, parenchyma diseases without hyperplasia, and cankers, galls, and tumors in which there is a more or less distinct hyperplasia. The diseases described in the present work are the encurbit wilt due to *Bacillus tracheiphilus*, the black rot of cruciferous plants due to *Bacterium campestris*, and the yellow disease of hyacinths caused by *Bacterium hyacinthi*. Each of these diseases is extensively treated, the symptoms, cause, distribution, characters of the parasite, methods of control, etc., being described. Numerous references to literature are given in connection with the several topics.

[Notes on plant diseases and their control], H. L. RUSSELL (Wisconsin Sta. Bul. 218, pp. 20-23).—Notes are given on investigations carried on at the Wisconsin Station on the use of fungicides, tobacco diseases, and the influence of cold on spore germination of certain rusts (E. S. R., 26, p. 342), and a plant disease survey.

It is reported that experiments by O. R. Butler indicate that lime sulphur proved inefficient in controlling the shot-hole fungus of the cherry, and that it also caused in several instances considerable damage in strong sunlight.

The investigations on tobacco diseases by J. Johnson include seed-bed diseases due to *Pythium debaryanum*. The results indicate that soil treatments are not to be recommended, and emphasize the importance of sterilization of the seed bed through burning by fires or with steam. A study was begun on the stem rot of tobacco, and 2 types of fungi, a *Fusarium* and a *Trichothecium*, were found in connection with the disease.

In the report on the plant disease survey, L. R. Jones calls attention to a serious leaf blight of barley due to *Helminthosporium*, losses of 25 to 75 per cent of the crop being noted. Fungus diseases of orchards are said to have been rather uncommon, due to the dry conditions prevailing during the summer. The cherry leaf spot was particularly destructive in some localities, and the crown gall and hairy root are said to be becoming serious. Climatic injuries, due to unseasonable weather conditions, were more or less conspicuous, and the author notes considerable trouble caused by *Septoria* and *Ascochyta* on peas and the *Fusarium* and *Phoma* diseases of cabbages. Attention is called to the necessity for the adoption of precautionary measures against the introduction of such diseases.

Some new or little-known plant diseases in Britain, F. J. CHITTENDEN (Jour. Roy. Hort. Soc. [London], 37 (1912), No. 3, pp. 541-550).—Notes are given on lettuce leaf rot due to *Marssonina panattoniana*, leaf spot of Campanula caused by *Ramularia macrospora*, and a streak disease of sweet peas which is attributed to *Thielavia basicola*.

The lettuce leaf rot is probably identical with that described by Selby (E. S. R., 8, p. 990), where the fungus was identified as *M. perforans*.

The streak disease of sweet peas is said to be characterized by brown streaks along parts of the stem and a yellowish tinge in the foliage, which fails to develop properly. The flower huds become yellow and drop without opening, or, in less advanced cases, open and show brownish or yellowish marks on the petals.

An examination of plants affected by this disease showed the presence of the fungus *T. basicola*, and a series of experiments was planned to determine methods of control. In pots which were made acid or alkaline by the addition of fertilizers, sweet peas were planted and half the pots inoculated with the fungus, but in no case did the resulting plants show any indication of disease. In a subsequent experiment the plants after attaining a growth of about 1 ft. in height were heavily overwatered and kept so for several days. The effect of this was very marked. Those in the uninoculated soil were slightly checked in growth, but with proper treatment subsequently as regards watering they recovered, while 75 per cent of those in the inoculated soil showed the development of the disease. It appears that the fungus attacks only the plants that have in any way been weakened, and care should be exercised to secure a good active growth to prevent the appearance of the disease.

Physalosporina, a new genus of *Pyrenomycetes*, N. WORONICHIN (*Ann. Mycol.*, 9 (1911), No. 3, pp. 217-225; *abs. in Bul. Trimest. Soc. Mycol. France*, 27 (1911), No. 3, p. 399).—A description is given of the genus and of the 6 species studied, also a comparative table of the characters of these species, named as follows: *P. megastoma*, *P. obscura*, *P. astragalina*, *P. astragalii*, *P. oaragana*, and *P. tramschellii*.

New studies on *Plasmodiophoraceae*, R. MAIRE and A. TISON (*Ann. Mycol.*, 9 (1911), No. 3, pp. 226-246, fig. 1; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, pp. 328, 329).—The authors here make a fuller report and continuation of previous work (*E. S. R.*, 21, p. 423; 25, p. 43), summarized as follows:

Tetramyza parasitica is one of the *Plasmodiophoraceae*, its endophytic development being similar in the main to that of other members of the family. Fungi of the genus *Ligniera*, which also belongs to this family, develop in roots of various plants but do not produce tumescence. The parasite *T. triglochis* is separated to form a new genus, *Mollisrdia*.

The relation of the family to the allied forms is also discussed.

Scleropycnis, a new generic type, H. and P. SYDOW (*Ann. Mycol.*, 9 (1911), No. 3, pp. 277, 278, figs. 4; *abs. in Bul. Trimest. Soc. Mycol. France*, 27 (1911), No. 3, pp. 401, 402).—A comparison is made of closely related species with this new form, which is described under the name *S. abietina* n. sp.

A culture study of *Hyalopsora polypodii*, P. DIETEL (*Ann. Mycol.*, 9 (1911), No. 5, pp. 530-533; *abs. in Ztschr. Landw. Versuchs. Österr.*, 14 (1911), No. 12, p. 1477).—It is claimed as a result of these investigations with *Hyalopsora* on *Cystopteris fragilis*, continued for 2 years, that this fungus can and does normally preserve and perpetuate itself by means of uredospores. These live through the winter and renew the fungus which, so far as its mycelium is concerned in the cases studied, dies out completely before spring. Telentospores appeared rarely in these experiments and their rôle in the case of this fungus was not ascertained.

Parasitism of *Nectria* and *Fusicladium*, E. VOGES (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 20-25, pp. 540-551, figs. 2).—Continuing previous studies (*E. S. R.*, 24, pp. 448, 450), the author discusses the nutritive relations of species of *Fusicladium* and *Nectria*, holding as the result of observations by himself and others that while *Nectria* is to be considered only a so-called "wound-parasite" *Fusicladium* is a true parasite.

Infection studies with *Peronospora*, G. VON ISTVANFFI and G. PALINKAS (*Centbl. Bakt.* [etc.], 2. Abt., 32 (1912), No. 20-25, pp. 551-564).—Continuing previous investigations (E. S. R., 25, p. 751), the authors made a study of *Peronospora* on beet and grape leaves by artificial infection of separated leaves and of plants growing in the open in wet and in dry weather and at varying temperatures, in order to ascertain the period of inoculation and the influence of relative humidity, temperature, and condition of the plant on its liability to develop the infection.

It was found that rapidity of development was variable, and that high relative humidity of the air, high water content of the plant, and sudden lowering of temperature all tended to render the plant more open to attacks by the fungus. Dryness tended to retard advance of the disease when already present.

The infection of forage grasses by ergot, E. GAIN (*Compt. Rend. Soc. Biol. [Paris]*, 72 (1912), No. 5, pp. 189-191).—It having been claimed that the spores of certain ergots, especially that of *Lolium*, require passage through the intestinal tract of insects to secure their germination, the author conducted some experiments with about 30 specimens of *L. perenne*, *Arrhenatherum elatius*, *Phleum pratense*, and *Holcus lanatus* to determine the rôle of insects in the spread of ergot among these grasses.

Inoculation experiments showed that ergot could be readily produced, but that insects played a secondary rôle, merely acting as carriers of the spores as in pollination, and that they were not essential to the dissemination of the fungus or to the infection of the host plant.

The use of iron sulphate for the control of the rust of plants, C. FUSCHINI (*Rivista [Conegliano]*, 4. ser., 17 (1911), No. 19, pp. 443-446; abs. in *Internat. Inst. Agr. [Rome]*, *Bull. Agr. Intel. and Plant Diseases*, 2 (1911), No. 11-12, p. 2600).—A preliminary account is given of experiments by the author on the application of considerable quantities of iron sulphate to the soil for the prevention of the rusts of wheat and beans.

In the experiments iron sulphate was added to the soil at the rate of 1.6 cwt. per acre for wheat and 2.4 cwt. for beans, after which the seed was planted. No difference could be noted for the wheat the following season, as there was but little rust in the vicinity. With the beans there was a considerable increase in weight of both the seed and plants. This is attributed to the use of the iron sulphate, which induced a much more vigorous vegetative growth.

The author is of the opinion that the application of iron sulphate before planting may be of use in preventing rusts in various crops through the general increase in the vigor of the plants, so that they can better resist the attacks of fungi.

A practical view of root rot of beets, H. BRIEM (*Ztschr. Zuckerindus. Böhmen*, 36 (1911), No. 1, pp. 23-25).—After a brief discussion of some opinions regarding the nature of this disease and remedies therefor, the author states that his experience leads him to the conclusion that a plentiful supply of lime in the soil in available form and the thorough aeration of the soil by means of the hoe are the most effective means for combating this disease.

Rice blight, J. S. COLLIER (*Illinois Sta. Circ.* 156, pp. 19, figs. 11).—In continuation of a previous report (E. S. R., 24, p. 743) and preliminary to an extended statement giving the entire data and the results of the experiments, the author gives an account of his investigations on rice fields in Arkansas.

The disease seems to be wholly a physiological one, and is not to be confounded with blights caused by insects or fungi. The root is the part of the plant affected, and the nutrition of the plant is so impaired that the grain does not develop. The results show that a good physical condition of the soil, with aeration at the proper time, will prevent blight. It is not caused by deep

flooding, and moving water diminishes the amount. Mineral salts had no effect on the disease, nor did the addition of ground limestone, aside from the general effect it had on the growth of rice through improved biological conditions.

From the results of the experiments, the author suggests that the disease may be controlled by the preparation of the soil and the seeding of the rice when the soil is in good condition to work. Rice should be flooded for the first time when it is about 8 in. high, barely covering the land with water for 6 or 7 weeks. At the time the head is forming in the "hoot" the water should be drained off and the soil aerated for 2 or 3 weeks, after which the fields are again to be flooded to a depth of about 3 in. for 4 or 5 weeks. The water should be gradually drained off until time to dry for harvest.

Preliminary study of the red rot of sugar cane in the Bombay Presidency, G. S. KULKARNI (*Dept. Agr. Bombay Bul. 44, 1911, pp. 8, pls. 3*).—The red rot disease due to *Colletotrichum falcatum* has become a serious trouble in some of the cane-growing regions of India. The distribution of the disease and symptoms are described.

From the author's observations it appears that the infection is most commonly through the use of diseased cane for planting. For the prevention of the disease it is urged that the sets be carefully examined and only those that show white pith at the cut ends be selected for planting. Any that show the slightest reddening should be destroyed.

The life history of the plum rust in England, F. T. BROOKS (*New Phytol.*, 10 (1911), No. 5-6, pp. 207, 208; *Gard. Chron.*, 3. ser., 50 (1911), No. 1295, p. 292; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 11-12, pp. 2603, 2604).—A severe epidemic of plum rust (*Puccinia pruni*) is said to have prevailed in fruit plantations of Cambridge-shire, England, the trees often being prematurely defoliated. There has been some doubt as to how the fungus survives the winter. Both uredospores and teleutospores are produced on plum leaves, but experimental proof is lacking that they can survive the winter and infect the leaves of the plum the following season.

Experiments by the author, in which aecidiospores of *Ecidium punctatum* from *Anemone coronaria* when placed on plum leaves produced the disease, confirm the claim of the heteroecium of *P. pruni*. The mycelium is perennial in *Anemone* and gives rise to crops of uredospores year after year, so that a few plants attacked by the aecidium are sufficient to account for the recurrence of the plum rust. After the first crop of uredospores has been produced on the plum leaves the fungus spreads rapidly on that host. Plants of *Anemone* affected by the fungus are said to have more fleshy leaves and to flower very rarely.

The eradication of plants of *A. coronaria* affected by the aecidium is suggested as a means of controlling this disease.

Experiments on the control of chlorosis of fruit trees, G. RIVIÈRE and G. BAILHACHE (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 33 (1912), No. 11, pp. 340-344).—Experiments are reported on the treatment of pear trees for chlorosis.

The trees were fed a solution of pyrophosphate of iron with ammonium citrate through holes near the base of their trunks. Inserted in the holes were tubes connected with vessels holding the solutions of the chemical. The solution, it is said, did not precipitate tannin and close the vessels of the wood, as is the case when some other iron compounds are used. Ten-year-old pear trees took up more than 14 liters of the solution, corresponding to 0.7166 gm. of the pyrophosphate of iron, in 87 days of the experiment. The chlorotic appearance of the trees was changed to a healthy one.

Resistance to chlorosis, A. VERNEUIL and R. LAFOND (*Rev. Vit.*, 46 (1911), No. 927, pp. 321-326).—During 1911 chlorosis appeared very destructive in certain regions of France to varieties of grapes hitherto considered resistant even when planted in lime soils. The season was a very rainy one and followed an unusually wet year. Previously, chlorotic vines treated with iron sulphate had given good crops, but in 1911 all failed.

A study was made of the vines, and especially of the maximum quantity of lime in the soils where the more resistant varieties could grow without showing chlorosis. The resistance to lime was found to vary with the different varieties, and the depth and character of the subsoil were found to influence materially the growth of the vines. Some varieties of grapes were found to tolerate as much as 45 per cent of lime in the soil, while the ordinary *Riparia* stock will not withstand much more than 10 per cent. In deep rich soils that are not excessively moist the tolerance was even higher. The authors claim that in the establishment of vineyards which are to remain for many years the depth and character of the subsoil must be taken into consideration.

Infection of grapes by downy mildew, J. J. KANAKOFF (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 33 (1912), No. 11, pp. 335, 335).—A brief account is given of spraying experiments for the control of mildew, which in 1911 was successfully combated by early and repeated sprayings. The application was made almost exclusively to the upper side of the leaves, thus confirming the conclusions of Ravaz and Verge (*E. S. R.*, 26, p. 550).

The conditions necessary for the appearance of downy mildew, L. RAVAZ and G. VERGE (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 33 (1912), No. 10, pp. 296-300).—A study has been made of the relation of temperature to the appearance of the conidia of the downy mildew, *Plasmopara viticola* (*E. S. R.*, 26, p. 851). Infested leaves were kept in thermostats and the temperature and time required for the appearance of the characteristic white spots of the mildew were noted.

None appeared at temperatures below 13° C., but they did show after 20 hours at that temperature. At about 20° the development is most rapid, a single day or night with this temperature accompanied by suitable humidity being all that is needed to induce a rapid growth. The development is somewhat slower at higher temperatures. In the spring of the year the temperature and other conditions at Montpellier are said to be seldom suitable before May 27 to promote the rapid spread of the fungus, while in autumn the conditions are usually very favorable and frequent successive invasions of the fungus are to be expected.

Experiments in the treatment of grapevine mildew in the Bombay Presidency, W. BURNS (*Dept. Agr. Bombay Bul.* 45, 1911, pp. 15, pls. 4).—An account is given of spraying experiments in which Bordeaux mixture was used for the control of the downy and powdery mildews of grapes. Two years' work has shown that thorough and timely spraying greatly reduces the loss commonly due to these fungi. The author notes the apparent resistance of one variety to mildew and frost injury.

The relation of meteorological conditions to diseases of the mulberry, G. ARNAUD and F. LAFONT (*Ann. École Nat. Agr. Montpellier, n. ser.*, 41 (1912), No. 3, pp. 169-215, figs. 25).—A report is given on the relation of weather conditions to attacks of *Nectria cinnabarina* and *Coryneum mori* on the mulberry, the studies on the former having been carried on at Montpellier, while the report on the latter is largely based on the work of Butler (*E. S. R.*, 22, p. 51). So far as the *Nectria* is concerned, and probably the same is true for the *Coryneum*, the authors believe that their occurrence as parasites on the mulberry is associated with the injury of the developing buds by late spring frosts. The

diseases at times are very destructive, especially where the mulberries are pruned closely.

Notes are also given on mulberry diseases due to *Bacterium mori*, *Gibberella pulicaris*, and *Botrytis cinerea*.

Banana diseases, W. FAWCETT (*West India Com. Circ.*, 27 (1912), No. 351, pp. 125, 126).—Accounts are given of the Panama disease due to *Ustilaginoidella musaperda* (E. S. R., 25, p. 349); the Surinam disease of bananas, which occurs with the Panama disease, but is distinct from it; the "Moko" plantain disease, due to *Bacillus musæ* (E. S. R., 25, p. 148); and the root disease caused by a species of *Marasmius*.

The Panama disease of the Gros Michel banana in Surinam, A. W. DAOST (*Dept. Landb. Suriname Bul.* 26, 1912, pp. 45, pla. 11).—According to the author's investigations, this disease was present in Surinam before the Gros Michel or Jamaica banana had been introduced. He claims that it is caused by the fungus *Leptospora musæ*.

The fungus penetrates through the root hairs, following the central bundle of the roots, and then spreads to the bulb and ascends into the vascular bundles of the leaf stalk. It attacks principally the bundles where suckers have been cut from the mother plant under the surface of the soil, and as a rule it does not reach the blade of the leaf. Besides perithecia, it is said to produce spores of a *Cephalosporium* and of a *Fusarium* type. Inoculations from pure cultures gave positive results.

The fungus was found to attack different varieties of *Musa*. It lives for a long time in the soil, from which it may infect new plantings. On this account soils once infected are said to be always unfit for Gros Michel banana cultivation. The moisture content of the soil is said to influence the susceptibility of bananas to the disease. The varieties of *M. paradisiaca* vary in their liability to infection by it, some varieties being practically immune.

The banana disease (*Jour. Jamaica Agr. Soc.*, 16 (1912), No. 2, pp. 90-92).—An account is given of the occurrence of the Panama banana disease in Jamaica.

Die-back or exanthema of citrus trees, E. O. ESSIG (*Pomona Col. Jour. Econ. Bot.*, 1 (1911), No. 2, pp. 73-82; figs. 2).—The author has brought together much of the information concerning die-back of citrus trees, which it is held is due to physiological causes.

The withertip disease in Florida, P. H. ROLFS (*Pomona Col. Jour. Econ. Bot.*, 1 (1911), No. 3, pp. 107, 108).—A brief account is given of the withertip of citrus trees as it occurs in Florida, and the author notes its frequent occurrence in California. For the control of this disease the best method in Florida is said to consist of thorough orchard sanitation followed by vigorous pruning out of the affected branches.

New fungi occurring on orange leaves, H. REHM (*Pomona Col. Jour. Econ. Bot.*, 1 (1911), No. 2, p. 106).—Technical descriptions are given of *Mycosphaerella lageniformis* n. sp. and *Scleroplea aurantiorum* n. sp., which occur on orange leaves in southern California.

Notes on *Scleroplea aurantiorum* and *Mycosphaerella lageniformis*, C. W. METZ (*Pomona Col. Jour. Econ. Bot.*, 1 (1911), No. 3, pp. 109, 110, fig. 1).—Supplementing the technical descriptions of these fungi (see above), the author gives an account of their attack on the host plants. The leaves upon which the fungi are found resemble those affected with withertip, due to *Colletotrichum gloeosporioides*. Both species are often found on the same leaf, but the larger perithecia of *Scleroplea* usually serve to distinguish them.

The author believes that the information at hand is not sufficient to justify conclusions relative to the economic importance of the fungi, whether they are both parasitic or not.

A new *Mycosphaerella* from Saxony, W. KRIEGER (*Ann. Mycol.*, 9 (1911), No. 3, p. 216; *abs. in Bul. Trimest. Soc. Mycol. France*, 27 (1911), No. 3, p. 398).—The new species, described and named *M. virgaurea*, is said to have been found in May, 1909, on leaves of *Solidago virga aurea* of the previous year's growth.

Mycological notes, F. VON HÖHNEL (*Ann. Mycol.*, 9 (1911), No. 3, pp. 215-216; *abs. in Bul. Trimest. Soc. Mycol. France*, 27 (1911), No. 3, p. 398).—The results are here given of a study of *Coniodictyum chevalieri*, which is alleged to cause galls on twigs and leaves of *Zizyphus* and to be identical with the fungus otherwise named *Hyalodema evansii* (E. S. R., 24, p. 252).

The slime disease of *Cyathea medullaris*, P. SORAUER (*Ber. Deut. Bot. Gesell.*, 30 (1912), No. 1, pp. 42-48, pl. 1).—This is a study by the author of a liquefying disease of this fern, said to be somewhat similar to gummosis, and associated with the presence of a fungus which is described and placed in the genus *Nectria*.

The Japanese chestnut at the experiment station at Lindois, A. PRUNER (*Bul. Soc. Nat. Agr. France*, 72 (1912), No. 2, pp. 131-137; *Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 3, pp. 522-524; *abs. in Rev. Sci. [Paris]*, 50 (1912), I, No. 9, p. 285).—In continuation of previous observations on the resistance of Japanese chestnuts to the black canker or root disease (E. S. R., 23, p. 49), the author reports experiments in which trees from 1 to 4 years old of common and Japanese chestnuts were planted in localities known to be badly infested as well as in a region where the disease was less prevalent.

Of 89 trees of the common chestnut planted in the badly diseased area, 86 died and 3 were badly infested. Of 48 common trees planted in less infected soils 33 died. In noninfested regions all remained sound. No Japanese chestnut trees were lost due to attacks of this disease, although 90 were planted in different situations.

A disease of the beech, P. MAONUS (*Sitzber. Gesell. Naturf. Freunde Berlin*, 1911, No. 10, pp. 436-439).—The author calls attention to a disease observed on beech in the Rhine region which quickly killed trees from 70 to 80 years old, and which he declared to be caused by a saprophytic fungus, *Agaricus muridus*, also called by several other names. The question as to the proper systematic placing of the species is also discussed.

Fungus galls on the beech, M. MÖBIUS (*Ber. Senckenb. Naturf. Gesell.*, 42 (1911), No. 1, pp. 7-12, figs. 3).—A description is given of *Cyttaria darwinii*, a fungus that causes galls on twigs and branches of *Fagus betuloides*, a beech native of the Southern Hemisphere.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A history of British mammals, G. E. H. BARRETT-HAMILTON (London, 1911, vol. 1, pts. 4, pp. 25-32+169-208, pls. 4, figs. 5; 5, pp. 33-40+209-248, pls. 3, figs. 5; 6, pp. 41-48+249-263, pls. 3, fig. 1; vol. 2, pts. 6, pp. 24, figs. 20; 7, pp. 25-72, pls. 4, figs. 3; 8, pp. 73-120, pls. 5, figs. 2; 9, pp. 121-163, pls. 4, figs. 6; 10, pp. 163-216, pls. 4, figs. 11).—This is a continuation of the work previously noted (E. S. R., 25, p. 150).

The Vespertilionidae are taken up in parts 4 and 5 and the Rhinolophidae in parts 5 and 6 of volume 1. Volume 2 deals with the land mammals. The order Insectivora is first taken up; the Talpidae, or common moles, are dealt with in parts 6 and 7; the Erinaceidae, or true hedgehogs, in parts 7 and 8; the Soricidae, or shrews, in parts 8 and 9; and the Rodentia in parts 9 and 10.

Some common mammals of western Montana in relation to agriculture and spotted fever, C. BIRDSEY (U. S. Dept. Agr., *Farmers' Bul.* 484, pp. 46, figs. 34).—This bulletin is based on investigations conducted in western Montana for several years, especially in the Bitter Root Valley, in cooperation with the Bureau of Entomology of this Department and with the Montana Station. A circular relating to the subject has been previously noted (E. S. R., 25, p. 756).

The author concludes that the most feasible ways of controlling Rocky Mountain spotted fever, which is transmitted from wild animals to human beings by the bite of infected ticks, are: "(1) To educate the inhabitants of infested localities in a belief in the 'tick theory'; (2) to lessen the number of wood ticks, by (a) keeping domestic stock, the principal hosts of the adult ticks, tick free and (b) lessening the number of native rodents, the necessary hosts of the younger states of the ticks; and (3) to destroy those native rodents which may serve as a source of continued reinfection of the ticks."

Directions for poisoning and otherwise destroying rodents are presented.

Analysis of the results of 87 fecal examinations of sheep dogs for evidences of parasitism, W. D. FOSTER (*Science*, n. ser., 35 (1912), No. 901, pp. 553, 554).—This is a brief statement of the results of examinations of collie and sheep dogs imported to this country, made while in quarantine.

All the dogs examined that were found to be infested with tapeworms were given a suitable tannafuge. Of 87 dogs examined, 50 were infested with parasitic worms, and of these 28 were infested with nematodes only, while the remainder were infested with tapeworms of 1 or more species or of tapeworms and nematodes. Of the 22 dogs infested with tapeworms, 7 were infested with *Tania hydatigena*, 8 with *T. pisiformis*, 4 with *Dipylidium caninum*, 2 with *Multiceps serialis*, and 8 with unidentified *Tenia*.

The author is inclined to believe that the small percentage of infestation shown in the examination is the result of the great care bestowed on valuable animals.

A new species of trematode from the muskrat, *Fiber zibethicus*, F. D. BARKER and J. W. LAUGHLIN (*Trans. Amer. Micros. Soc.*, 30 (1911), No. 4, pp. 261-274, pl. 1).—The trematode here described as *Notocotyle quinqueserialis* n. sp., is one of a large number of trematodes, representing several species, that were found in the alimentary canal of muskrats, near Calloway, Nebr.

Microbes killing mice and rats, A. VOYTKEVICH and A. KOLENEV (*Věstník Bakt. Agron. Stantsii V. K. Ferrein*, 1911, No. 18, pp. 97-153).—An extended discussion of the subject.

Raticide—Azoa, S. S. MERESHKOWSKY (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 62 (1912), No. 1-2, pp. 72-75).—The author's investigations led him to conclude that the commercial preparation known in England by the name Raticide and in America as Azoa can not be recommended for use in destroying rats.

The food of birds of India, C. W. MASON and H. MAXWELL-LEFBOY (*Mem. Dept. Agr. India, Ent. Ser.*, 3 (1912), Jan., pp. 371).—This paper is said to be a compilation from various sources of what little is known of the food of Indian birds at the present time. It also contains numerous field notes on the food of the common species of the plains, together with the records of 1,325 stomachs examined in the laboratory.

Chronology and index of the more important events in American game protection, 1776-1911, T. S. PALMER (U. S. Dept. Agr., *Bur. Biol. Survey Bul.* 41, pp. 62).—This bulletin contains a brief historical summary of game legislation in this country and related matters, a chronology from 1776 to 1911 of State and Federal legislation and other data of interest, and a subject index to the chronology.

A contribution to the physiology and morphology of the digestive apparatus of insects, C. SCHLÜTER (*Ztschr. Allg. Physiol.*, 13 (1912), No. 3, pp. 155-200, pls. 3).—This account includes a bibliography of 42 titles.

Insect pest survey, H. L. RUSSELL (*Wisconsin Sta. Bul.* 218, pp. 23-25).—It is stated that following the nearly complete loss of fruit by the late spring freeze in 1910, the majority of fruit insects were left without their normal food, and, consequently, but few completed their life cycle for winter hibernation. The codling moth and plum curculio were almost entirely eliminated as destructive factors in fruit growing in some regions. The pear slug is said to be reaching proportions where much damage is annually occasioned to the cherry and plum. The apple aphid was unusually abundant during the year, and the growth of young trees stunted thereby. The cottony maple scale was again abundant, and the asparagus beetle was reported from several sections. Both the onion thrips and onion maggot are causing severe losses in the trucking regions in the southeastern part of the State. Locusts or grasshoppers were unusually destructive in some sections, likewise the blister beetles, which have caused no little injury to alfalfa and vetch. The damage by blister beetles is partly atoned for by the good which their larvae accomplish in feeding on grasshopper eggs which they destroy by the thousands.

Farmers' foes and their remedies (*Dept. Agr. Brit. Columbia Bul.* 24 [1908], pp. 200, figs. 73).—This compilation deals largely with insect pests occurring in British Columbia and remedial measures therefor. A chapter on plant diseases is included.

Insect pests in the West Indies in 1911 (*Agr. News [Barbados]*, 11 (1912), No. 254, pp. 26, 27).—This is a brief account of the more important insect pests of the year in the British West Indies.

Insect notes for the year 1910-11, P. L. GURRY (*Id. Agr. Trinidad Circ.* 3, 1911, pp. 3-14, figs. 2).—This paper, which is a more extended account than that previously noted (*E. S. R.*, 25, p. 357), deals with the insect enemies of cacao, rubber, tobacco, cotton, and other crops.

Miscellaneous notes, F. W. URICH (*Id. Agr. Trinidad Circ.* 3, 1911, pp. 15-25, fig. 1).—Miscellaneous papers are here presented. The first, which relates to ants on cacao estates, includes a preliminary list of 69 forms of Trinidad ants; the second deals with rats and other mammals on cacao estates; the third consists of notes on insecticides, etc.

[Destructive insects, 1910] (*Id. Agr. and Fisheries [London], Ann. Rpt. Intel. Div., 1910-11, pt. 2, pp. 27-38, pl. 1*).—Among the more important insects considered in this report are the grapevine phylloxera, the large larch sawfly (*Nematus erichsonii*), the potato tuber worm, the cherry fruit fly (*Rhagoletis cerasi*), the narcissus fly (*Merodon equestris*), etc.

Report of the entomological section of the Wellcome Tropical Research Laboratories, H. H. KINO (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum*, 4 (1911), *B. Gen. Sci.*, pp. 95-150, pls. 7, figs. 30).—The author first reports upon animals injurious to man and animals, including mosquitoes and their control; blood-sucking flies other than mosquitoes, particularly tabanids, with a list of blood-sucking flies recorded from the Anglo-Egyptian Sudan with the localities in which they are known to occur; Eristidae; and ticks. The animals injurious to farm and garden crops considered include the Dura stem-borer (*Sesamia cretica*), the black or greasy cutworm (*Agrotis ypsilon*), the aspid fly (*Aphis sorghum*), the cotton stem borer (*Sphenoptera neglecta*), the melon weevil (*Baryscapus traxardi*), the melon stem borer (*Apomecyna binubila*), the melon leaf beetle (*Aulacophora foreicollis*), the diamond-back moth (*Plutella maculipennis*), the cabbage bug (*Bagrada picta*), the rigia gall weevil

(*Baris lorata*), the fig stem-boring beetle (*Sinoxylon eudanicum*), white ants, and the black garden ant (*Aphanogaster barbara*).

The plants diseases ordinance of 1910 is appended to the report.

Suppression of the cotton white scale in Piura, C. H. T. TOWNSEND (*Bol. Dir. Fomento [Peru], 9 (1911), No. 3, pp. 1-7*).—This paper briefly considers the cotton white scale (*Hemichionaspis minor*), the cotton square weevil (*Anthonomus* sp., probably *vestitus*), the cotton strainer (*Dysdercus ruficollis*), etc.

Insect pests of jute, H. L. DUTT (*Dept. Agr. Bengal, Quart. Jour., 5 (1911), No. 2, pp. 107-110*).—This important fiber crop has several important insect enemies, including leaf feeders and capsule and stem borers. Particular mention is made of the indigo caterpillar (*Laphygma exigua*), the jute semilooper (*Cosmophila sabulifera*), and the "behari" hairy caterpillar (*Diactrisa obliqua*).

The enemies of rye, P. NOEL (*Bul. Lab. Régional Ent. Agr. [Rouen], 1911, No. 4, pp. 4-7; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 11-12, p. 2623*).—The author lists 37 insect enemies of rye.

Fruit flies and other insects attacking cultivated and wild fruits in New South Wales, W. B. GURNEY (*Agr. Gaz. N. S. Wales, 23 (1912), No. 1, pp. 75-80, pls. 2, figs. 9*).—This third paper (E. S. R., 26, p. 150) deals with the island fruit fly (*Trypeta musæ*), the tomato fly (*Lonchaea splendida*) which sometimes attacks citrus fruit, the ferment fly (*Drosophila obscura*) which attacks all classes of damaged fruit, fruit-eating beetles of the genus *Carpophilus*, and the identification of fruit fly maggots.

New control methods for the pear thrips and peach tree borer, E. L. MONSIEUX (*California Sta. Bul. 228, pp. 367-374, figs. 6*).—The investigations of control measures for the pear thrips here reported are based on experiments conducted during 1910 and 1911 in a pear orchard near San José, Cal. Experiments carried on in 1910, in which applications of whitewash were made in different amounts by spraying before the buds were open sufficiently to admit the thrips, resulted in finding the number of blossoms to be in direct proportion to the amount of whitewash applied. The trees which had a thin coating of whitewash had very few blossoms, while those which had a very thick coating of whitewash had an abundance. The amount of fruit corresponded to the number of blossoms.

In 1911 the experiment was repeated on a larger scale. An application of lime made with a view to showing that the whitewash would have the same beneficial effect when applied a week or more before the buds open, as when applied at the time of opening, was rendered worthless by an untimely down-pour of rain. A second application made just as the buds were beginning to open gave results similar to those of 1910. All the sprayed trees came into full bloom and the unsprayed trees blossomed very feebly; the fruit corresponded very closely to the blossoming, the sprayed trees averaging 8 times as much as the unsprayed trees.

Eighty lbs. of quicklime was used to make 100 gal. of spraying material, the whitewash being strained through a 1/14 in. mesh wire screen and the same sized screen used on the suction hose of the pump. The ordinary Bordeaux nozzles worked well, but it was necessary to enlarge slightly the opening in the disks of the Vermorel type nozzles.

The work with the peach tree borer (*Sanninoidea pacifica*), an insect of much economic importance in the horticultural district around the southern arm of San Francisco Bay, was conducted at Berryessa, Cal. Experiments by the author led to the use of hard asphaltum, grades "C" and "D" with good

results. "This was applied early in the spring to badly infested trees from which the borers had not been dug. It was found that a thick heavy coating prevented both the issuance and the entrance of about 95 per cent to 98 per cent of the insects, the degree of efficiency depending upon the thoroughness of the application. Asphaltum does not penetrate, crack, deteriorate, or blind the tree, since it yields to the slightest pressure. Four years of experimenting have not shown the least injury." The material while warm was applied from 5 in. below to 5 in. above the ground by means of a brush. Two coatings are said to be generally sufficient, unless the bark is very rough. The borer is seldom uniformly distributed over an orchard, and it is not necessary that all of the trees be treated with asphaltum, although it is necessary to examine them carefully in order to discover those that are infested. The author has also used asphaltum to a limited extent for covering wounds and for grafting.

Roaches and their extermination by the use of sodium fluorid (NaF), M. F. GATES (*U. S. Naval Med. Bul.*, 6 (1912), No. 2, pp. 212-214).—The author finds that the cockroach can be quickly, cheaply, and completely eliminated from ships or houses by the use of sodium fluorid. Since the insects do not take it voluntarily but lick it off their feet it should be dusted thinly but widespread where they are most numerous. It must be kept dry in order to adhere to the feet of the roaches.

The rice grasshopper (*Hieroglyphus banian*), L. C. COLEMAN and K. K. KANNAN (*Dept. Agr. Mysore, Ent. Ser. Bul.* 1, 1911, pp. 52, pls. 5, figs. 4).—This is a detailed account of studies of the rice grasshopper, including its life history and preventive and remedial measures.

South American Acridoidea, L. BRUNER (*Ann. Carnegie Mus.*, 8 (1911), No. 1, pp. 5-147).—Two hundred and three species are here considered of which 10 genera, 61 species, and 1 variety are described as new to science.

Information relative to the enemies of the olive in the Province of Jaén, L. NAVARRO (*Bol. Agr. Téc. y Econ.*, 3 (1911), No. 33, pp. 797-809).—*Phlaothrips oleæ* appears to be a most important insect enemy of the olive in the Province of Jaén, which is located in the southern part of Spain.

Kala-azar and the bedbug (*Lancet [London]*, 1912, I, No. 8, p. 520).—A discussion of some recent investigations.

Test sprayings for the gloomy scale (*Chrysomphalus tenebriosus*), Z. P. METCALF (*Jour. Econ. Ent.*, 4 (1911), No. 6, pp. 515-521).—"The gloomy scale is the most important insect enemy of shade trees in North Carolina, and is well distributed over all this State south and east of the mountains. Its importance is due to 2 factors, the enormous rapidity with which it breeds and the fact that it is all but completely confined to the soft maples which have been so largely used for shade purposes in our cities and towns."

The experiments here reported led the author to conclude that any of the soluble oils 1:8 or 1:10 are satisfactory remedies if used while the tree is dormant, one application being sufficient for several years where the infestation is slight or moderate. Where the scale is serious 2 or more applications are advisable.

"None of the commercial lime-sulphur washes were as satisfactory for controlling the gloomy scale as the soluble oils. This we believe is accounted for by the fact that the dorsal scale of this insect is thicker and applied more closely to the ventral scale than is the case in the San José scale. Our observations would lead us to believe that the oils owe their superior killing powers to the fact that they remain moist much longer than the lime-sulphur preparations and are thereby enabled to creep in between the dorsal and ventral scales. The corrosive lime-sulphur washes do not seem to be able to penetrate the thick

dorsal scale of this insect. Some of the lime-sulphur washes gave fair results and if spraying for the gloomy scale could be repeated year after year, as in the case of the San José scale, they might be recommended. But with shade trees this is usually not practicable. None of the spring applications were at all satisfactory, and it was impossible to see that any of the trees sprayed in the spring had been benefited to any marked degree."

Ap[ro]pos of *Aleyrodes olivinus*, C. CAMPBELL (*Ab[stracts] in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 7, p. 1836).—The author calls attention to the fact that *A. olivinus*, described by Silvestri (E. S. R., 23, p. 149) as a new olive parasite in central and southern Italy, and recently recorded by Chapelle as a new olive pest in Spain, is not only found in Italy but also in Tunis, where the author has himself found specimens. He has also noted its presence in Smyrna.

The larger canna leaf-roller (*Calpodes ethlius*), F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 145*, pp. 10, figs. 8).—During the year 1911 the canna leaf-roller was abundant in various parks in the District of Columbia, at West Grove, Pa., and at points as far south as Orlando, Fla. This circular describes its injury and method of attack, distribution, stages, life history and habits, natural enemies, and methods of control.

The caterpillars of this butterfly appear to attack only plants of the genus *Canna*, when these are obtainable, at times utterly destroying luxuriant plants. Attention is attracted to its injury by the large irregular areas which are cut away from the margin of the canna leaves. The larva cuts a small, more or less oblong strip about $\frac{1}{2}$ in. long from the edge of the leaf and folds it over on the lower surface. Within this nearly flat flap it lies concealed, feeding above and below its retreat. As it increases in size the larva makes large incisions in the leaf's edge with a correspondingly large flap, and later forms large tubular retreats. A portion of the lower side of the leaf is at times folded over the upper surface. On August 24, 1907, this pest was present in all stages in great abundance on canna at Orlando, Fla.

The species, which is of tropical origin, appears to be killed by severe frosts. So far as can be learned it is known to exist permanently in the United States only in the Gulf States, South Carolina, and Porto Rico. It also inhabits Cuba and Jamaica, and in South America occurs as far south as Argentina.

The eggs, which are laid singly and separately, sometimes in groups of from 5 to 7 on the undersurface of the leaves, hatch in from 4 to 6 days. The larva is said to pass through 5 stages. The egg parasite *Pentathron minutum* has been observed to be an important enemy at Orlando, Fla. Handpicking has been successfully practiced in parks at Washington, D. C., as has the squeezing of the leaves with gloved hands. Paris green and arsenate of lead with or without Bordeaux mixture can be used with little danger of poisoning, although their use appears to be undesirable where children have access to the plants.

Combating the cochyliis and eudemis moths, G. DALMASSO (*Staz. Sper. Agr. Ital.*, 43 (1910), No. 7-9, pp. 593-645).—This is a report of experimental studies of remedial measures for these grapevine pests, conducted at Milan.

A note on some mucedines observed on *Cochylis ambiguella*, G. FROX (*Bul. Trimest. Soc. Mycol. France*, 27 (1911), No. 4, pp. 432-437, pl. 1).—This paper relates chiefly to *Botrytis bassiana* (= *Spicaria bassiana*) and *Spicaria verticillioidea* n. sp.

Observations on lamp traps for the cochyliis moth, V. VERMOREL (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 32 (1911), No. 29, p. 70; *ab[stracts] in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 7, pp. 1819, 1820).—In experiments conducted by the author an acetylene lamp was placed in a tray at one end of a large closed room, 50 meters (164 ft.) long, and after-

wards cochylys and eudemis moths, which had been bred in captivity; were liberated at different distances from the lamp. When liberated not more than 25 meters from the lamp the cochylys moths flew to the lamp and were drowned in the tray; the eudemis moths seemed to be unaffected by the light at that distance.

The potato moth, A. H. COCKAYNE (*Jour. New Zeal. Dept. Agr.*, 2 (1911), No. 4, pp. 179-186, figs. 4).—This is an account of the life history and of control measures for the potato tuber worm, a severe outbreak of which was experienced in the South Island, New Zealand, the 1911 crop being very materially affected in certain localities.

The light brown apple moth (*Tortrix* [Cacæcia] *responsana*), C. FRENCH (*Jour. Dept. Agr. Victoria*, 10 (1912), No. 2, pp. 111-113, fig. 1).—This moth, which is found in most parts of Victoria, is said to be a very destructive insect, attacking almost any kind of garden plant, as well as apples and other fruits.

The Microlepidoptera of the vineyard, F. PICARD (*Prog. Agr. et Vit. (Ed. l'Est Centre)*, 32 (1911), No. 15, pp. 448-469, pl. 1, fig. 1).—This is a summarized account of information relating to the grapevine pyralid (*Enophthia pilleriana*), the cochylys (*Cochylis ambiguella*), and the eudemis (*Polychrosis botrana*) moths.

The "schlafsucht" of the meal moth caterpillar, E. BEBLER (*Ztschr. Gesam. Getreidew.*, 3 (1911), No. 3, pp. 63-70).—This paper reports experiments in which the caterpillars of the meal moth were inoculated, moistened, and fed with the causative bacterium. It was found to possess a high virulence, 100 per cent mortality resulting in some instances, both when applied externally and when ingested.

The Mycetophilidae of North America, Part III, O. A. JOHANNSEN (*Maine Sta. Bul.* 196, pp. 249-328, pls. 5).—In this third part (*E. S. R.*, 23, p. 762) of the author's work on the fungus gnats, the subfamily Mycetophilinae is dealt with. The work includes tables for the separation of the genera and species. Numerous species are described as new to science.

"As far as known all of the species of this subfamily pass the earlier stages in mushrooms or decaying wood. The larvae of several species of *Exechia* and of *Mycetophila* are occasionally found in cultivated mushrooms, *M. punctata*, quite frequently. This species is also particularly common in wild mushrooms, at times very few plants escaping infestation. Mushroom growers need expect but little trouble from these pests if they will provide their cellars with fine mesh wire screens."

The identity of the better known midges galls, E. P. FELT (*Ottawa Nat.*, 25 (1912), Nos. 11, pp. 164-167; 12, pp. 181-188).—This is a descriptive list of some of the earlier named species of cecidomyids.

New West Indian gall midges, E. P. FELT (*Ent. News*, 23 (1912), No. 4, pp. 175-177).—In this paper the author describes as new to science *Bruggmanniella pisonæ*, reared from the stems of *Pisonia nigricans*; *Mycodiplosis pulvinaria*, the larvae of which were found preying upon *Pulvinaria pyriformis*; *Arthrocnodax meridionalis*, reared from *Eriophyes* galls, including galls of *Eriophyes gossypii* on Sea Island cotton; and *Hyperdiplosis producta*, reared from what presumably were mite galls in the inflorescence of *Stachytarpha jamaicensis*. All were from St. Vincent Island.

Second contribution to the knowledge of the Brazilian species of *Simulium*, A. LUTZ (*Mem. Inst. Osvaldo Cruz*, 2 (1910), No. 2, pp. 213-267, pls. 4).—In this second paper (*E. S. R.*, 23, p. 762), which is principally systematic, 17 species are described as new to science.

Dr. A. Lutz's studies of Brazilian *Simuliidae*, F. KNAB (*Proc. Ent. Soc. Wash.*, 13 (1911), No. 3, pp. 172-179).—The first part of the work reviewed in

this paper has been previously noted (E. S. R., 23, p. 762); the second part is noted above.

The evolution of *Trypanosoma evansi* through the fly: *Tabanus* and *Stomoxys*, F. S. H. BALDREY (*Jour. Trop. Vet. Sci.*, 6 (1911), No. 3, pp. 271-282, pls. 2).—In the observations reported many hundreds of flies were used and 500 slides examined, and in no case was development of the parasite further advanced than in the spore or piroplasmic form observed. "This appears to indicate that the development was either arrested or that the cycle is completed in another way, probably through the egg of the fly or by a second cycle through a mammalian animal."

Observations of the tachinid parasite of the nonne moth (*Parasetigena segregata*), F. TIMAEGS (*Naturw. Ztschr. Forst u. Landw.*, 9 (1911), No. 2, pp. 89-95, fig. 1).—This paper, which includes a note by K. Escherich, under whose direction the studies were conducted, deals with the incubation period of the eggs and the entrance of the larvæ into the host.

References are given to literature on the subject.

The control of the olive fly and Prof. Lotrionte's experiments (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 7, pp. 1836-1838).—A study made by G. Lotrionte of aromas or scents most attractive to the olive fly, the influence of colored light, etc. is here summarized.

Glucose was found much more attractive than molasses. An olive grove about 1 kilometer from other olive groves and sprayed 4 or 5 times with a mixture of glucose diluted with 20 per cent of water and 2 per cent of copper sulphate, was scarcely infected (0.33 per cent) whereas groves which had not been thus treated were infected to an extent of from 9 to 23 per cent. All olive trees treated with this mixture were in excellent condition, and free from sooty mold and from attack by *Cycloconium*.

Numbers and types of bacteria carried by city flies, J. C. TORREY (*Jour. Infect. Diseases*, 10 (1912), No. 2, pp. 166-177).—"Flies examined up to the latter part of June were free from fecal bacteria and carried a homogeneous flora of coccid forms. During July and August there occurred periods in which the flies examined carried several millions of bacteria, alternating with periods in which the number of bacteria were reduced to hundreds. The scanty flora probably indicated the advent of swarms of recently hatched flies. Fecal bacteria of the colon type were first encountered in abundance the early part of July. The bacteria in the intestines of the fly were 8.6 times as numerous as on the surface of the insects. On the surface of the flies the colon group bacteria constituted 13.1 per cent of the total; and within the intestine 37.5 per cent of the total.

"Of the lactose fermenters, isolated and identified, 79.5 per cent belonged in the colon-aerogenes group and 20.5 per cent in the acid lactic group. Fifteen cultures of streptococci, isolated and identified, were distributed among the equinus, fecalis, and salivarius groups. There were none of the pyrogenes type. The most important isolations were 3 cultures of *B. paratyphosus*, Type A.

"Bacteria of the paracolon type causing a final intense alkaline reaction in litmus milk and fermenting only certain monosaccharids were frequently encountered during August."

Contribution to the knowledge of the biology of European rat fleas (*Ceratophyllus fasciatus*), N. H. SWELLENGREBEL (*Arch. Schiffs u. Tropen Hyg.*, 16 (1912), No. 6, pp. 169-182, figs. 4).—The author's studies are presented under the following headings: Distribution of fleas in the docks and other parts of Amsterdam, feeding experiments with the blood of man and the rat, longevity of unfed fleas, destruction of fleas, and personal prophylaxis.

Discussion on the spread of plague, C. J. MARTIN (*Brit. Med. Jour.*, 1911, No. 2654, pp. 1249-1261, figs. 7).—Accounts are given of the transmission of plague by fleas, including a report of cage experiments; experiments in specially constructed brick animal houses from which fleas could be practically excluded; the fate of the plague bacillus in the body of the rat flea, and the mechanism by means of which the flea infects a healthy animal; the approximate proportion of fleas in the stomachs wherein multiplication of bacilli takes place; and similar topics.

An attack of *Hylesinus piniperda* and *H. minor* in upper Dalarna, Sweden, T. LAGERBERG (*Skogsvårdsför, Tidskr.*, 1911 *Ålmänna Delen*, No. 11, pp. 331-395, figs. 7).—An illustrated account of the injury caused by these scolytids, including a bibliography of 12 titles.

The southern pine beetle and its control, W. E. HINDS (*Alabama Col. Sta. Circ.* 15, pp. 43-58, figs. 4).—This circular embodies most of the information relating to *Dendroctonus frontalis* given in Farmers' Bulletin 476 (E. S. R., 26, p. 476), together with other data. This pest is causing the death of pine trees of various species in increasing numbers, in Alabama.

The movement of the Mexican cotton boll weevil in 1911, W. D. HUNTER (*U. S. Dept. Agr., Bur. Ent. Circ.* 146, pp. 4, fig. 1).—During the season of 1911 the boll weevil was greatly reduced in numbers throughout its entire range, as the result of a combination of climatic influences extending over a period of about 3 years. So unfavorable were the conditions that the insect was exterminated in an area covering about 23,000 square miles in the northwestern portion of Texas and the western portion of Oklahoma.

Notwithstanding this great reduction in 1911, considerable advance was made to the East and North when the dispersion movement began in August. As a result of this extensive dispersion much of the territory it had lost in Texas and Oklahoma was regained, and Florida became invaded for the first time.

A map is given which shows the dispersion of the cotton boll weevil from 1892 to 1911.

The insect enemies of the cotton boll weevil, W. D. PIERCE, R. A. CUSHMAN, and C. E. HOON (*U. S. Dept. Agr., Bur. Ent. Bul.* 100, pp. 92, pls. 3, figs. 26).—The authors' investigations are here presented in 3 parts, part 1 (pp. 12-39) dealing with the status of the cotton boll weevil and its enemies; part 2 (pp. 39-83) with the biological complex; and part 3 (pp. 83-96) with the economic application. A bibliography of 54 titles is appended.

The authors consider the control of the boll weevil by insect enemies to be sufficiently great to give it a high rank in the struggle against the pest. "A considerable portion of the insect control would not be accomplished by any other factor; hence it is by no means to be neglected. The number of species of insects attacking the developing stages is 49. The control in any given place consists of the combined work of several different species. Places having the largest number of controlling insects have the highest percentage of control. In many places insect control is considerably greater than climatic control or than any other class of factors. The average insect control is 20 per cent of all immature stages or two-fifths of the entire natural control.

"The cotton leaf-worm is a valuable enemy of the boll weevil when it defoliates the cotton after September 1, a date beyond which new squares can not be expected to mature. It kills many weevils by starvation, kills many others while consuming the squares, and finally forces a premature hibernation which is generally fatal.

"The amount of control due to the various factors at work in any given place should be increased if possible. Parasites can be introduced into new

fields. In order to prevent serious injury to cotton, the mortality of the weevil should be above 90 per cent. It has averaged over 57 per cent for 4 years and has reached almost 100 per cent several times. While climatic influences occasionally bring the control above 90 per cent, they can not be regulated or in any way directly utilized. . . .

"The parasites and predators which attack the boll weevil are native insects, already present in a given territory before the weevil arrives. . . . The weeds surrounding the cotton fields contain many weevils which are harboring multitudes of available parasites. These parasites may be induced to attack the boll weevil by the timely elimination of their native hosts. This leads to the recommendation that planters cut the weeds adjoining the cotton fields, along the roadsides, turn rows, and fences about the time of the maturing of the crop. It also leads to the recommendation that a field adjoining the cotton be used as a pasture or hay field, and that this field be mowed early in the fall. The usual haying will also bring about the same result—namely, the elimination of other plants harboring weevils which attract the parasites needed in the cotton patch. . . .

"The cultural methods of controlling the cotton boll weevil are the most favorable methods of cotton culture from the parasitic standpoint. . . . The fact that many more parasites are reared in hanging squares than in fallen squares makes it desirable in humid regions to have many of the hanging squares in a field in order to serve as a nursery of parasites for the weevils in and fallen squares. . . .

"Any step which will diminish the number of weevils and not diminish the number of parasites in a field will of course increase the percentage of parasites present. The most important step of this kind is the collection of infested squares and placing them in cages with a screen through which the weevils can not escape but the parasites can. Ant colonies may be introduced into the fields in boxes of fresh manure."

A weevil (*Esiotus leucurus*) destructive to pine trees (*Pinus halepensis*), W. W. FROGGATT (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 1, pp. 55, 56, pl. 1).—It is stated that this weevil is destroying every pine tree in an avenue in the neighborhood of Stratfield.

Historical notes on the causes of bee diseases, E. F. PHILLIPS and G. F. WHITE (*U. S. Dept. Agr., Bur. Ent. Bul.* 98, pp. 96).—This bulletin reviews papers relating to the etiology of bee diseases, in chronological order. The purpose of the bulletin is to assist bee keepers in obtaining a proper understanding of the work done by the various investigators.

Descriptions of two new genera and six new species of parasitic Hymenoptera, A. B. GAHAN (*Proc. Ent. Soc. Wash.*, 14 (1912), No. 1, pp. 2-8).—The new species here described include *Allorhogas gallicola* n. g. and n. sp., reared from cynipid twig galls on *Quercus pinifolia* from which the moth *Synanthedon scitula* was reared and on which it is thought to be parasitic; *Synaldis incisa* n. sp., taken from cages in which the Hessian fly was being reared and on which it is possibly parasitic; *Ditropinotus flavicorus* n. sp., taken from a room in which quantities of insect-infested meal and other ground feed was stored; *Agromyzaphagus detrimentosus* n. g. and n. sp., reared from the puparia of an agromyzid fly, probably *Leucopis nigricornis*; and *Hoplogryon kansasensis* n. sp., taken from a cage in which experiments with the Hessian fly were being carried on.

The cotton leaf hllster mite in Barbados (*Agr. News [Barbados]*, 11 (1912), Nos. 258, p. 90; 259, p. 106).—It is stated that *Eriophyes gossypii*, first discovered in Barbados on February 27, 1912, infests an area which includes a strip some 2 or 3 miles wide along the westward coast for a distance of 18

miles, the southern limit apparently being about 4 miles southeast of Bridgetown. A committee has been appointed by the government of the Island to investigate and report upon the steps that should be taken to stamp out the pest.

Insecticides: Mixtures and recipes for use against insects in the field, the orchard, the garden, and the house, H. MAXWELL-LEFROY (*Agr. Research Inst. Pusa [India] Bul. 23, 1911, pp. 22, pls. 11*).—A popular account including illustrations of spraying apparatus and of the author's mosquito trap.

FOODS—HUMAN NUTRITION.

The bacteriology of eggs and egg products with special reference to *Bacillus coli*, O. MAURER (*Kansas Sta. Bul. 180, pp. 333-344*).—Eggs were examined for the presence of *B. coli*, the work being undertaken as a part of a study of the economic aspects of the egg industry and particularly with reference to the deterioration of frozen and desiccated eggs.

Sixty fresh clean eggs from 30 different hens, the eggs being collected twice a day from trap nests, 50 eggs obtained from local farms, and 25 dirty eggs obtained from a packing house were used. "These [dirty] eggs were at least 3 weeks old, and were fairly covered with droppings." The colon bacilli were absent from the contents of all the eggs studied and from the shells of about 77 per cent of the clean eggs, and from 82 per cent of the farm eggs, but were found on the shells of all of the dirty eggs.

Experiments were made under a variety of conditions, including low temperature, with eggs smeared with feces (fecal bacteria) and egg and with a suspension of *B. prodigiosus*. In general, the results indicated that the microorganisms under consideration did not penetrate the unbroken shells of the eggs.

Experiments also showed that concentrated egg albumin did not exercise any bactericidal action upon *B. coli*, a result in harmony with that of other investigators. "Indeed, the presence of large numbers of colon bacilli in frozen and desiccated eggs would be impossible if the egg possessed bactericidal properties for this organism."

"It seems, therefore, that the only explanation we can give for the absence of *B. coli* from fresh eggs and from the oviduct is the lymphoid structure of the mucosa of the oviduct. This probably causes the removal, by leucocytic activity, of colon bacilli which have reached the oviduct, together with other intestinal organisms."

In general, the author concludes that fecal matter, which owing to the way they are handled comes in contact with the egg contents when they are broken and the yolk and white separated, is the source of the large number of colon bacilli often present in egg preparations.

"The bacterial content of canned eggs may be greatly reduced by separating only clean eggs. All soiled eggs which either directly or indirectly might give rise to fecal contamination of the egg meat should be utilized without separating the white from the yolk."

"[In preparing such egg products] the girls who break the eggs should wash their hands whenever they come in contact with the contents of bad eggs or with other contaminating material. The wash water should be used only once; indeed, a pail with water in which the girls frequently wash their hands makes matters worse. The cups into which the eggs are broken, and all other utensils that come in contact with the egg meat, should be washed in clean water whenever touched by contaminating material. These should not have any crevices, corners, etc., where material may accumulate, but should be as

smooth as possible. Glass cups are best. Live steam should be applied liberally to sterilize utensils, etc.

"The room in which the eggs are broken should be as cool as it can possibly be kept without making the inmates uncomfortable. The cleaner the room and everything in it, the fewer bacteria the product prepared in it will contain. The egg meat should be transferred to the freezing room as soon as possible."

A discussion of the healthfulness of frozen and desiccated eggs and of the need and value of bacteriological methods of judging them, O. MARRÉ (*Kansas Sta. Bul. 180, pp. 345-350*).—In connection with a summary of data regarding the bacterial contamination of egg products, experiments were made on the effects of heating such eggs for varying periods of time to 65, 70, and 75° C., in a water-jacketed oven.

When samples were heated to 75° the solubility of the goods was rapidly decreased.

With regard to wholesomeness, the author concludes that "in the absence of physical signs of decomposition, there is no danger of poisonings or bacterial infections through egg products.

"Bacteriological methods for judging the healthfulness of egg preparations are unnecessary and inapplicable.

"The sanitary conditions under which frozen and desiccated eggs are produced can not be judged by our present bacteriological methods, because the bacterial content of egg preparations is subject to great seasonal and local variations.

"Factory inspection should enforce sanitary methods of production and should exclude from the frozen and desiccated products all eggs that are not admitted to the market in the shell. . . .

"The bacterial content of desiccated eggs can, by keeping them for from 1 to 2 hours at 65 to 70°, be greatly reduced without decreasing their solubility very much. Practical tests will have to decide whether the advantages derived from the lower bacterial content would counterbalance the disadvantages arising from the somewhat lower solubility."

Besides desiccated eggs designed for food similar goods are made for trade purposes.

"In the manufacture of tanners' eggs, the sound portion of spot-eggs, eggs showing blood rings, and slightly off-flavored eggs are used. After desiccation, this product can hardly be distinguished, by its physical appearance, from first-grade eggs. When one sees and tastes this product, it seems a needless waste that it should be excluded from human consumption. Perhaps future researches will show us that a good many eggs which are now prepared for tanners are perfectly healthful and fit for human consumption. . . .

"All eggs that are really unfit for food, however, should be denaturalized, to prevent unscrupulous people from selling them for food purposes. . . . After such eggs are sold to the tanners, it is very hard to keep track of them, and they may in a roundabout way make their appearance in cheap restaurants, etc. Denaturalization of such preparations is the only sure way to prevent their use as food products. It would easily be possible to find a substance which, when added to tanners' eggs, would serve as a telltale without exerting a deleterious effect upon the leather."

Proper handling of dressed poultry, MARY E. PENNINGTON (*Butcher's Advocate, 52 (1912), No. 22, pp. 11, 12, dms. 4*).—This article includes a description of the refrigerating plant used in connection with the work of the U. S. Department of Agriculture (*E. S. R., 25, p. 579*) in a laboratory devoted to the problem of handling poultry, a description of the temperature variations in

refrigerator cars, methods of packing and shipping poultry, and the changes likely to affect the birds during transportation.

Bacterial purification of oysters by floating in filtered artificial sea water, FABRE-DOMERGUE (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 6, pp. 393-395).—A description of tanks for floating oysters. Artificial sea water is passed through the tanks in which the oysters are placed, pumped through a filter, and again passed into the tanks. In the opinion of the author the results are practically the same as those with natural sea water.

Floating oysters in filtered artificial sea water, E. BODIN (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 7, pp. 446, 447).—An account of tests made with oysters floated in tanks similar to those described in the above article.

Oysters may be floated in such tanks for a month without losing their vitality or good appearance. Slight changes in flavor may take place after one week. As a method of bacterial purification, the method is considered as satisfactory as floating in natural sea water.

Cheese and its economical uses in the diet, C. F. LANGWORTHY and CAROLINE L. HUNT (*U. S. Dept. Agr., Farmers' Bul.* 487, pp. 49).—This popular summary includes data regarding cheese making, the care of cheese in the home, and the flavor of cheese, describes the kinds of cheese used in American homes, and discusses the food value of cheese, its composition, nutritive value and cost as compared with other foods, its digestibility, its use in the diet, and the making of bills of fare with cheese as the central food.

Directions are given for preparing homemade cheeses and a large number of cheese dishes of different sorts, which have been studied experimentally.

The widespread belief that cheese is not thoroughly digested and that it is often a cause of physiological disturbance is not substantiated by the experimental data summarized in this bulletin.

As a whole, the bulletin calls attention to the high nutritive value of cheese and the possibility of using it in many ways.

Kafir corn flour bread, C. DILLON (*Northwest. Miller*, 90 (1912), No. 2, pp. 79, 80, figs. 4).—A description of baking tests made by students of the Kansas Agricultural College in 1911. Various recipes for breads, cakes, etc., were studied experimentally, white durra flour, black-bull Kafir flour, white durra meal, and black-bull Kafir meal being tested.

The only difference noted between the white and the black-bull flours, or the corresponding meals, was the darker color of the black-bull products. In bread making it was found that these meals and white flour 1:1, 1:2, or 2:1 all made fairly satisfactory loaves, though a mixture containing the highest proportions of white flour made the lightest bread.

"The meal makes a good substitute for corn meal, as it can be used in practically every case that corn meal is used. When the meal is used alone, more liquid is required to mix it, and it lacks sufficient gluten to hold together. It also is rather harsh and flat tasting when used by itself, but when mixed with wheat flour the flavor is pleasant. The wheat flour also supplies the gluten, which makes its use much more successful. In most cases a mixture of two of meal to one of flour is good and in nearly all cases a mixture of 'half and half' is successful."

Coffee and coffee substitutes (*Quart. Bul. Bd. Health N. H.*, 1 (1912), No. 1-2, p. 3).—Analyses are reported of various coffee mixtures and coffee substitutes.

"Incidentally it is of interest to note the difference between the now well-known non-coffee containing coffee substitutes and the newer coffee-cereal mixtures, in that, whereas the former consist mainly or wholly of bran, worth in most cases not over 3 or 4 cts. a pound at the most, the cereal or leguminous

portion of the latter is apt to represent the whole berry, rather than mere refuse."

Food analyses No. XXXVII, H. P. Cady and Jackson (*Bul. Kans. Bd. Health*, 8 (1912), No. 3, pp. 53-63).—Analyses of miscellaneous food materials are reported.

[Food inspection and other pure food and drug topics], E. F. Ladd and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul.*, 2 (1912), No. 1, pp. 16, fig. 1).—Chemical preservatives, coal-tar dyes, and other questions are considered and data reported regarding the examination of miscellaneous food products.

A paper by R. E. Remington on the protein content of vinegar gives analyses of vinegars, malt vinegars, and sugar vinegar, and a determination of protein in fresh juice expressed from Jonathan apples. The filtered apple juice, preserved for several weeks, yielded 0.007 per cent nitrogen, corresponding to 0.044 per cent protein. The analytical data are discussed with reference to vinegar standards.

If further work should confirm the authors' report, "and the protein content in nonsugar solids in cider vinegar be found to lie within comparatively narrow limits, i. e., 0.8 per cent to 1.5 per cent, this determination will furnish a simple means of detecting adulteration of cider vinegar with grain or molasses vinegar, on the one hand by high protein content, and with distilled vinegar on the other by low protein content."

L. A. Congdon reports a study of the coating and polishing of rice. His conclusions follow:

"The principal reason that rice is coated is for covering up poorer grade and quality.

"Rice is said to be prepared commercially by a polishing process, in which glucose, 1/1,000, and talc, 1/3,000 part of the whole, are added. Paraffin and rice starch are sometimes used in place of glucose and talc.

"Rice may be said to be coated with talc, glucose, and rice starch if the percentage of solids in the washings of the rice is above 1 per cent, and the percentage of ash in washings is above 1/10 of a per cent.

"Rice may be said to be coated with glucose and rice starch if the percentage of solids in the washings of the rice is above 1 per cent, and the percentage of ash in the washings is below 1/10 of a per cent.

"Rice may be said to be uncoated or not polished to any degree if the percentage of solids is below 1 per cent in the washings, and the percentage of ash in the washings is below 1/10 of a per cent; provided the rice has been tested for a coating of paraffin. Paraffin was found in 1 sample to the amount of 0.260 per cent."

[Food inspection and other pure food and drug topics], E. F. Ladd and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul.*, 1 (1911), No. 39, pp. 453-468, figs. 2).—Results of the examination of a number of samples of miscellaneous food products, beverages, and sugar beets are reported, and various food topics discussed.

Twenty-sixth annual report of the Ohio Dairy and Food Commissioner, S. E. STRODE (*Ann. Rpt. Ohio Dairy and Food Comr.*, 26 (1911), pp. 117, pls. 3).—A report of legislation, recommendations, prosecutions, inspections, analyses of miscellaneous food products, and similar data.

[A summary of the work of the food and dairy commission for the year ending June 30, 1911] (*Ann. Rpt. Food and Dairy Comr. S. Dak.*, 11 (1911), pp. 117).—Inspections, prosecutions, and analyses made are reported and a summary of the publications of the commission included.

Laws of Massachusetts pertaining to the business of slaughtering (*Boston: State Bd. Health, 1911, pp. 12*).—A summary of the laws regulating slaughtering in Massachusetts, with special reference to the changes required by the acts of 1911.

The progress of international commerce in perishable foodstuffs, H. HITIER (*Ann. Géogr., 21 (1912), No. 116, pp. 109-117*).—A summary of the development of commerce in perishable goods, with special reference to conditions on the continent of Europe.

Gas and electric cooking (*Jour. Gas Lighting, 118 (1912), No. 2551, pp. 17, 18*).—An account of tests made in England.

The initial cost of an electric cooker and installation is reckoned as 75 per cent more than that of a gas cooker. Comparative tests were made of the cost of boiling water and baking sirloin of beef, cakes, etc. In all cases the cost of fuel was found to be greater with the electric cooker than with gas. In the sirloin of beef the loss by evaporation was 13 per cent with the electric, and 16 per cent with the gas cooker. In boiling 1 qt. water it was found that the electric cooker required 12 minutes longer than the gas ring, and that the electricity required cost 0.5 ct. more than the gas.

A gas cooker of novel construction (*Jour. Gas Lighting, 117 (1912), No. 2550, pp. 870, 871, figs. 4*).—The oven here described is built with 2 metal walls with an air space between, the gas heating the air in the latter. It is claimed that as there is no gas burning in the oven spurting fat will not come in contact with the flames and cause a disagreeable smell, and that since the oven is enclosed the loss through evaporation during cooking will be less than in the ordinary oven. Temperature and cooking tests are given which, according to the author, indicate the economy of a cooker of this description.

The conditions of nourishment of pupils in Munich public schools, K. OPPENHEIMER and W. LANDAUER (*München. Med. Wchnschr., 58 (1911), No. 42, pp. 2218-2220; 59 (1912), No. 13, pp. 705, 706, dgm. 1*).—The first of these articles reports a study of the physical condition of school children in 2 public schools in Munich, one in a district populated mainly by day laborers, and the other in a district including some families in more easy circumstances. Age, general condition, weight, height, chest, and upper arm measurements were noted, and the relation between height and body weight of each child was calculated. Comparing the figures thus obtained with those commonly accepted as standard for children of various ages, the authors found that the children in both the schools investigated, but notably in that in the poorer section of the city, were on the average decidedly below normal.

The second article is an answer to criticisms called out by the deductions that the children here studied were necessarily undernourished. The authors suggest the distinction between quantitative and qualitative undernourishment and discuss the most satisfactory means of determining general physical development from physical measurements and similar topics.

Second experimental march to investigate the amount of food required by men on active service (*Jour. Roy. Army Med. Corps, 17 (1911), No. 6, pp. 629-643*).—The march here reported was made in August, 1910. It lasted 13 days, included men and officers, and was in every way comparable with the previous march (*E. S. R., 25, p. 236*). The men returned to the same camp each night. Physical measurements were taken every morning under conditions as nearly uniform as possible. The weather conditions were hardly better than during the first march, while the character of the roads was worse.

The ration was varied somewhat from that of the first march, bacon and cheese being substituted for part of the meat in different quantities during dif-

ferent periods of the march. The ration of jam was increased and pickles were added, but this latter addition was not appreciated by the men. The total ration provided 142 gm. of protein per man per day during the first week, and 175 gm. during the second week of the march. The average energy supplied was 4,511 calories per man per day. The total muscular work, external and internal, was calculated as 3,989 calories per man per day, an amount practically identical with that noted during the previous march.

The weight curves show an average gain during the first few days, next a slight fall, followed by a second gain, and a second smaller fall. Instead of an average loss such as appeared during the previous year, there was an average gain of 0.16 kg. in the weight of the men at the end of the march. They showed no symptoms of underfeeding, as in the previous case, and considered their diet in every way adequate.

In the opinion of the committee, a ration furnishing 4,500 calories of energy per man per day, and containing a larger proportion of fat and sugar than that found in the present ration, should be adopted by the British Army.

It is stated that the nitrogen balance of 2 of the officers during the second experimental march will be published later.

The disappearance of beri-beri from the Philippine (native) scouts, W. P. CHAMBERLAIN (*Military Surg.*, 28 (1911), No. 5, pp. 509-522).—During the year 1910 changes were made in the rations for Philippine scouts which slightly preceded the change which was effected in the general Philippine ration. This preliminary change did not substitute unpolished for polished rice, but reduced the amount of polished rice, substituting for it legumes, ginger root, and various native vegetables. Aside from the change in the diet, conditions among the Philippine scouts remained practically the same as those in other native troops.

The health sheet of the scouts showed no remarkable changes except the disappearance of beri-beri. The Board for the Study of Tropical Diseases as They Exist in the Philippine Islands, which suggested the change, believes that the disappearance of the disease is due to the substitution of other vegetables for part of the polished rice. It does not hold that this contradicts the polished rice theory of beri-beri, but rather that it supports it, the substitution of vegetables for part of the polished rice in its opinion furnishing necessary mineral matters lacking in the polished rice.

Report of the U. S. Army Board for the Study of Tropical Diseases as They Exist in the Philippine Islands, W. P. CHAMBERLAIN, H. D. BLOOMBERG, and E. B. VEDDER (*Military Surg.*, 28 (1911), No. 4, pp. 445-452).—Data are summarized regarding the disappearance of beri-beri from the native Philippine scouts which followed a change in ration. The preparation of rice of different sorts is discussed and some data presented regarding the experimental work with poultry on rice in relation to the development of polyneuritis.

The influence of fat in the food upon the body fat of carp, J. KÖNIG, A. THIENEMANN, and R. LAMPRICH (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 5, pp. 177-197).—Among the conclusions drawn as the result of these investigations were that feeds with a high fat content produced a high fat content in the flesh of fish. Phytosterin was not detected in the body fat. The nature of the food fat or its cleavage products affected the taste of the fish, and in certain cases it became unpalatable. Analyses of the experimental animals and of several other species of fish are reported.

The condition of the liver as influenced by various kinds of food fats, S. S. CHALATOW (*Arch. Path. Anat. u. Physiol. [Virchow]*, 207 (1912), No. 3, pp. 452-469).—The author fed rabbits and white rats on diets consisting in different instances of sunflower seed oil, beef tallow, liver fat, ox brain, and

egg yolk, the experiment being continued for periods of several months each.

The most common phenomena which occurred in all of the experiments was that in the first period after the beginning of the feeding the liver of the animals became filled with greater or less quantities of fatty substances. With continued feeding of the same materials the fat masses in the liver not only did not increase, but, on the contrary, became gradually smaller and finally disappeared entirely.

The various fats did not produce the same effects in the animals. Whereas, according to the author, the liver disposed of sunflower seed oil, liver fat, and beef tallow with considerable ease, and feeding these substances produced no serious changes in the liver, feeding with egg yolk and ox brain brought about, in all cases, noticeable and generally similar pathological changes in the liver, which increased as the feeding periods lengthened. From this it may be concluded that these changes were not conditioned by the fats, but rather by the lipoid substances (probably those of the lecithin group) which in such cases were filtrated into the liver cells, together with the neutral fat, and frequently surpassed the latter in amount.

The effect of the different fats was not the same on rabbits as on rats. This difference in the behavior of the 2 species as regards the lipoid substances can, the author believes, be attributed to the fact that certain anatomical peculiarities of the rabbits produced certain not yet understood fermentations under the influence of which toxic modifications are produced out of the lipoid substances. In general, the changes produced when rats were fed with egg yolk were similar to those taking place in rabbits fed with sunflower oil, liver fat, and beef tallow.

Lecithin and its significance, J. NERKINO (*Internat. Beitr. Path. u. Ther. Ernährungstör. Stoffw. u. Verdauungskrank.*, 3 (1912), No. 3, pp. 455-461).—This article is a summary of the theories regarding the rôle of lecithin in nutrition and its therapeutic use. The author concludes that for the latter chemically pure lecithin is necessary, but that most of the preparations commercially obtainable are of this character.

The respiration calorimeter—application to the study of problems of vegetable physiology, C. F. LANGWORTHY and R. D. MILNER (*U. S. Dept. Agr., Office Expt. Stas. Circ. 116*, pp. 3).—A brief description is given of the large calorimeter used for experiments with man and of a new respiration calorimeter of smaller size suitable for experiments with fruits and similar products which has recently been installed. Reference is also made to a micro-calorimeter for use in the experimental study of very small quantities.

Recording and controlling devices of special construction involving much that is new and original have been used in the construction of the respiration calorimeter designed for the study of vegetable problems, so that the instrument will be very largely automatic in operation and can be operated at the same time and by the same observers as are employed upon experiments with man in the large calorimeter.

The work which has been done thus far with ripening fruit has demonstrated that the respiration calorimeter is fully as well suited to the study of certain fundamental problems of plant life as to the study of similar problems of animal life.

The apparatus can also be used, it seems safe to conclude, in studying such problems as the changes which take place when meat or cheese or other similar products are cured or ripened, and factors which influence these changes; that is, problems which are of commercial interest as well as of agricultural, domestic, and scientific importance.

ANIMAL PRODUCTION.

[Nutrition investigations], H. L. RUSSELL (*Wisconsin Sta. Bul. 218*, pp. 4-10, figs. 4).—A brief report of work in progress at the station on the efficiency of rations from single plant sources, studies in protein nutrition, mineral requirements of farm animals, grain mixtures for feeding show sheep, and silage versus silage for dairy cows.

Analyses of fodder plants, grasses, ensilages, etc., J. C. BÄNNICH (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1910-11, pp. 56, 57).—Analyses are reported of white panicum (*Panicum frumentaceum*), common panicum (*P. germanicum*), *P. bulbosum*, summer grass (*P. sanguinale*), Japanese millet, blady grass (*Imperata arundinacea*), blue grass (*Andropogon sericeus*), scented blue grass, 3 varieties of *Vigna catjang* (mammoth, purple and black cowpea), tall oat grass (*Anthistiria avenacea*), American grass (*Tripsacum dactyloides*), lab lab bean (*Dolichos lab lab*), sorghum, native vetch, red Natal grass (*Tricholena teneriffæ*), lucern, and *Lotus australis*.

The use of ensilage (*Bul. Off. Gouv. Gén. Algérie*, 1911, No. 15, Sup., pp. 251-315, figs. 14).—This discusses the different types of silos, and methods of growing silage crops and feeding silage, with special reference to Algerian conditions.

The large sunflower and sunflower cake, J. H. PAPAIOANNOU (*Ann. Gembloux*, 22 (1912), Nos. 2, pp. 74-101; 4, pp. 209-234, pls. 2).—A review of experiments relating to growing and utilizing the sunflower and its by-products as a feeding stuff, including the methods of growing the plant and feeding it. Analyses of the stem, leaves, head, seed, and cake, and samples of rations containing sunflower cake are given.

[Analyses of feeding stuffs], A. P. SANDLES (*Ann. Rpt. Ohio Bd. Agr.*, 65 (1910), pp. 441-512).—This is the official report of feeding-stuff inspection during the year 1910. The analyses reported include cotton-seed meal, linseed meal, gluten feed, malt sprouts, hominy feed, distillers' and brewers' dried grains, tankage, beef scrap, and proprietary mixed feeds.

Stock feed: Bran, shorts, chop feed, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 231*, 1912, pp. 41).—Analyses are reported of bran, shorts, middlings, and mixed feeds.

Investigations on the stomach of ruminants, especially the Tragulidæ, E. SCHMIDT (*Arch. Naturgesch.*, 77 (1911), I, No. 2, pp. 1-49).—A study of the comparative anatomy of the stomach of ruminants. Those of the species examined appeared to be on the same general plan. Hyæmoschus having the simplest and cattle the most complex type. The S-form of paunch in the embryonic calf is very similar to that of the mature paunch of the Tragulidæ.

A bibliography is appended.

The effect of alcohol on the movements of the paunch in ruminants, O. KNAUFF (*Klinische und Experimentelle Studien über die Wirkung des Spiritus auf die Mägen der Wiederkäuer. Inaug. Diss., Univ. Giessen*, 1911, pp. 76, pl. 1, figs. 19).—The frequency of the paunch movements in cattle, sheep, and goats was found to be dependent upon the nature of the food. The frequency and intensity was increased immediately after eating or after the administration of alcohol.

The significance of the pulse rate in vertebrate animals, FLORENCE BUCHANAN (*Ann. Rpt. Smiths. Inst.*, 1910, pp. 487-505, figs. 3).—The heart weight, pulse rate, and oxygen supply of wild and domesticated birds and mammals are given. The method of taking the pulse rate of small birds and mammals by means of a capillary electrometer is described, and the value of collecting such data is pointed out.

There was found to be a relatively larger heart in the more active animals, which means better staying power, as the longer diastole gives more time for recuperation. Small hearts and quick pulses are more characteristic of domesticated animals than of wild animals, except the race horse, as the most active individuals, because of their unruly nature, are often discarded for breeding purposes.

Contribution to the knowledge of the temperature of the skin of horses and cattle, R. SPOERL (*Beiträge zur Kenntnis der Hautwärme bei Pferd und Rind. Inaug. Diss., Univ. Gießen, 1911, pp. 49*).—Temperatures taken in different parts of the body under different conditions are presented in tabular form.

In all cases the temperature of the skin was lower than the rectal temperature, and in all parts of the body was lower in cattle than in horses. The highest temperature was along the median line of the udder in cows, and near the heart and on the throat in horses. The lowest temperatures were at the extremities of the limbs.

Role of interstitial testicular cells, L. MAZZETTI (*Anat. Anz., 38 (1911), No. 14-15, pp. 361-387, figs. 14; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 6, p. 740*).—Interstitial cells from the frog, bird, dog, and man were found to be transformations of connective cells which proliferate between the tubules. They may also arise from lymphatic lacunae. It is thought that they are of either no importance or possibly of some slight significance in connection with secondary sexual characters.

Biometric ideas and methods in biology; their significance and limitations, R. PEARL (*Scientia, 10 (1911), pp. 101-119; abs. in Zentrbl. Allg. u. Expt. Biol., 2 (1912), No. 21-23, p. 546*).—The author sketches the rise and progress of biometry as a method of research in anthropology and biology, and shows that the real purpose of biology is quantitative treatment and does not imply any particular theory of heredity or variation. Its particular use lies in the fact that it solves the problem of describing the group in terms of its attributes and qualities, and not of individuals. Some of the limitations of the method and the errors that may arise in the improper use of biometric methods are pointed out.

Skull measurements in man and the hoofed mammals, H. F. OSBORN (*Science, n. ser., 35 (1912), No. 902, p. 596*).—The cephalic indexes and limb ratios are considered by the author to have the value of specific characters and, therefore, to be more significant than direct measurements in the study of comparative anatomy of hoofed animals. For example, in a cross between the horse and ass the cephalic indexes are found to be pure nonblending characters. Among the most significant indexes are the cephalic, the cranial, and the facial.

Breeding in the State of São Paulo, Brazil, L. MISSON (*L'Élevage dans l'État de São Paulo (Brésil). Govt. [1910?], pp. 90, figs. 58*).—A general statistical article, with special reference to pure-bred live stock.

Stock breeding in Kafa, Abyssinia, BIEBER (*Deut. Rundschau Geogr., 1911, No. 7; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 6, p. 1402*).—An outline of the live-stock situation.

The principal kinds of animals kept are zebras, fat-tailed sheep, horses, mules, and goats. The fowls are small and lay but few eggs, which are not eaten by the natives. Live stock methods are very primitive. Oxen are used only for plowing, horses for riding, and asses and mules as pack beasts. Milk is used chiefly for butter making. All kinds of live stock are cheap. Civets are also bred on a large scale, but only males are reared to any extent, as the females do not yield the product used in perfumery and tobacco factories.

The live-stock markets of London (*Breeders' Gaz., 61 (1912), No. 16, pp. 937, 938, figs. 6*).—An account of the English methods of marketing live stock

as seen at Islington and Deptford, as contrasted with customs in American live-stock markets. In 1911, 50,324 cattle were received at Islington, as compared with 223,600 in 1887, and the number of sheep 330,745, as compared with 877,810 in 1893. At Deptford the number of cattle arriving in 1911 was 66,877, a decline of about 5,000 from the previous year. It is thought that there will be a still further decline in both markets.

Reproduction and inheritance in race hygiene, M. VON GRUBER and E. RÜDIG (*Fortpflanzung Vererbung Rassenhygiene. Munich, 1911, pp. 178, figs. 230*).—This contains photographs and detailed descriptions of the exhibits at the International Hygiene Exhibition held at Dresden, 1911, which illustrate reproduction, variability, selection, mutation, inheritance of acquired characters, laws of inheritance, Mendel's law, inheritance in man, degeneracy, race hygiene, and neomalthusianism.

A bibliography of about 1,000 titles on these topics is appended.

The Bakker-Dettweiler theory of the ancestry of the black and white cattle, H. LAESSIG (*Mitt. Deut. Landw. Gesell., 27 (1912), No. 2, pp. 21-24*).—The author believes that the conclusions of Bakker and Dettweiler (*E. S. R., 26, p. 166*), regarding the color of cattle at different times in the history of Holland are erroneous, because they are based largely on the colors of cattle in paintings. The Dutch painters were colorists, and consequently used color in many cases where it did not occur in nature.

On the origin and classification of our domesticated cattle, P. HOLDEFLEISS (*Illus. Landw. Ztg., 31 (1911), No. 86, pp. 805-807*).—The author thinks that the introduction of black cattle from Jutland to Holland took place much earlier than stated by Dettweiler (*E. S. R., 26, p. 166*). In the study of relationships, it is thought that too much emphasis has been laid upon osteological differences, whereas pigmentation and other physiological properties have been minimized.

The origin and classification of our domesticated cattle, G. LAUBER (*Illus. Landw. Ztg., 31 (1911), No. 91, pp. 850, 851*).—The author points out that pigmentation is of little diagnostic value because the different breeds can not be separated into spotted and shaded types as Holdefleiss indicates in the article noted above. The question of geographical distribution of breeds is also discussed.

The cattle of Friuli, E. MASCHERONI (*Corriere Macelli, 2 (1911), No. 2, pp. 15-20; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 6, pp. 1403, 1404*).—A general and statistical article on the cattle industry in Friuli. Since 1878 the cattle have been much improved by crossing the native draft stock with the Simmental. There are about 250 co-operative creameries in the province, and 70,000 calves are exported annually. The methods of fattening cattle are described.

Returns at the Modena slaughterhouse, G. SQUADRINI (*Corriere Macelli, 2 (1911), No. 3, p. 32; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 6, pp. 1419, 1420*).—Data show that the Modena lowland breed of cattle is superior in net returns to the mountain breed, and also to other breeds slaughtered except the Bologna, Romagna, and Friuli breeds.

The exportation of cattle, C. ROELLS and A. V. HERNÁNDEZ (*Econ. Mexicano, 52 (1911), No. 19, pp. 361-365*).—This contains statistics on the exports of cattle and hides from Mexico. From 1903 to 1910, inclusive, 983,899 head of cattle and 84,892 tons of hides were exported.

On the effects of castration and ovariectomy upon sheep, F. H. A. MARSHALL (*Proc. Roy. Soc. [London], Ser. B, 85 (1912), No. B 576, pp. 27-32*).—This

article discusses the differences in the horn growth of the various British breeds, and reports experiments with the Herdwick breed.

"The development of horns in the males of a breed of sheep in which well marked secondary sexual differentiation occurs (as manifested especially by presence or absence of horns) depends upon a stimulus arising in the testes, and this stimulus is essential, not merely for the initiation of the horn growth but for its continuance, the horns ceasing to grow whenever the testes are removed.

"The removal of the ovaries from young ewes belonging to such a breed does not lead to the development of definitely male characters, except possibly in an extremely minor degree."

The native sheep of Manche, G. GAUDOT (*Jour. Agr. Prat.*, n. ser., 23 (1912), No. 10, pp. 308-309, pl. 1).—The characteristics of the sheep in the department of Manche, and in particular the native breeds found in the region along the shores of the English Channel, are described.

The sheep of the Roman fields, B. BIANCHINI (*Gior. R. Soc. Naz. Vet.*, 59 (1910), Nos. 51, pp. 1218-1223; 52, pp. 1252-1256; 53, pp. 1265-1269; 60 (1911), Nos. 5, pp. 108-112; 6, pp. 123-127; 7, pp. 145-148; 8, pp. 175-179).—A description of the types of sheep, both native and introduced, with a view to their improvement by better breeding and management.

Grazing farms, W. G. BROWN (*Queensland Agr. Jour.*, 28 (1912), No. 2, pp. 98-101).—Estimates are given of expenditures and returns on a 20,000-acre sheep ranch in Queensland.

Iceland wool, A. E. INGRAM (*Daily Cons. and Trade Rpts.* [U. S.], 15 (1912), No. 82, p. 89).—This gives the amount and value of exports of Iceland wool to the United States and Great Britain, and recommendations for preparing and grading wool for export.

Algerian wool (*Bul. Off. Gouv. Gén. Algérie*, 1911, No. 14, Sup., pp. 207-247; abs. in *Internat. Inst. Agr.* [Rome], *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 7, pp. 1725, 1726).—Statistical data on the wool production in Algeria since 1870 are reported.

A few observations on birth of goats, ALBRECHT (*München. Tierärztl. Wchnschr.*, 55 (1911), Nos. 29, pp. 481-485; 30, pp. 501-506).—These articles report data on birth weight and after-birth weight, the relation of these weights to each other and to the weight of the mother, and the length of the parturition period.

A cage for metabolism experiments on goats, A. R. ROSE (*Biochem. Bul.*, 1 (1911), No. 2, pp. 222-226, pl. 1).—This is a more detailed description of a contrivance previously noted (*E. S. R.*, 26, p. 268).

Breeds of pigs suited for breeding on a small scale, SCHWARZ (*Arb. Landw. Kammer Pommern*, 1911, No. 22, pp. 22; abs. in *Internat. Inst. Agr.* [Rome], *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, pp. 1410, 1411).—This contains brief descriptions of breeds of pigs raised in Germany, with methods of feeding and breeding.

Chinese pork for export, R. S. GREENE ET AL. (*Daily Cons. and Trade Rpts.* [U. S.], 15 (1912), No. 101, pp. 390-393).—This consists of brief reports from several consulates.

The feeds commonly used to produce pork for export consist largely of by-products of the rice mills, soy-bean oil factories, breweries, and distilleries. The pork is stated to be of good quality and not more subject to disease than that produced elsewhere. Hankow is the center of the export trade in hogs, but it is stated that the finest pork comes from the province of Yunnan.

Monographs on the Belgian draft horse, H. DE THEULEGOET (*Monographie du Cheval de Trait Belge. Brussels, 1911, pp. 122, pls. 14*).—This contains the pedigrees and photographs of good types of Belgian draft horses. There is also a brief account of the origin of the domesticated horse, and particularly the origin of the breeds found in Belgium.

Origin of the Percheron horse, G. POWELL (*Farm and Ranch Rev.*, 7 (1911), Nos. 22, pp. 750-752; 23, pp. 792, 793).—This is a translation of a chapter from a new book on the horse by G. Trolet.

Some early importations of noted horses to this province, J. RICHARDS (*Ann. Rpt. Dept. Agr. Prince Edward Island, 1911, pp. 79-87, fig. 1*).—These are notes on the importation of pure-bred horses to Prince Edward Island, begun with that of True Briton, a Suffolk Punch, imported in 1824.

Horse breeding in the time of Frederick William II, P. MARTELL (*Therarzt.* 51 (1912), No. 7, pp. 97-102).—A historical note on horse breeding in Germany, with special reference to the efforts of Frederick William II to improve the character of horses used for military purposes.

Horse breeding in South Africa, W. G. RATTRAY (*Agr. Jour. Union So. Africa*, 3 (1912), No. 2, pp. 205-218).—This contains some historical notes on the character of the horses in South Africa. It is advocated that more attention be paid to the breeding of horses in the future.

Kansas State Live Stock Registry Board: Report No. 2 (*Kansas Sta. Bul.* 179, pp. 209-331, pls. 14).—This contains portions of the text of the state law relating to the registration of stallions and a discussion of its benefits, fraudulent pedigrees, the status of the non-standard stallion, and similar topics. There are several popular articles on the breeding and management of horses written by different authors, and a list of stallions, licenses, and transfers for the year ended October 1, 1911.

Origin of the domestic dog, EL L. TROUESSART (*Compt. Rend. Acad. Sci. [Paris]*, 152 (1911), No. 13, pp. 909-913, figs. 2; *abs. in Jour. Roy. Micros. Soc. [London]*, 1911, No. 6, p. 743).—The author agrees with the suggestion of Jettles that the ancestor of domesticated dogs is to be found in the small Indian wolf (*Canis pallipes*), which has a well-marked supra-orbital crest. There is an exception, however, in the dog of ancient Egypt, recently discovered by Hiltzheimer, Gallard, and Lortet, and which seems to have been derived from several species of jackal. The author does not agree with Studer's conclusion that the domestic dog is descended from a European species which became extinct in the Quaternary period.

The poultryman's guide, compiled and edited by T. E. QUISENBERRY (*Mountain Grove, Mo.* [1912], pp. 249, figs. 187).—This work is issued by the Missouri State Poultry Board, and is a compilation of information gathered from many sources and covering all phases of the poultry industry.

Notes on the history of barred breeds of poultry, R. PEARL (*Biol. Bul. Mar. Biol. Lab. Woods Hole*, 22 (1912), No. 5, pp. 297-308, figs. 3).—These notes relate to the origin of the Cuckoo Pekin bantam and the Barred Plymouth Rock. There is a discussion of the probability of the barring factor arising de novo. The data given suggest the possibility that in the early history of the Barred Plymouth Rocks the males were heterozygous as regards barring instead of homozygous as at present.

Campines in Belgium, England, and America, F. L. PLATT (*Rel. Poultry Jour.*, 19 (1912), No. 2, pp. 266, 267, 330-334, figs. 4).—An account of the characteristics of the Campine and Braekel breeds of fowl, and of the origin of the Campine-Braekel crosses.

Increasing the egg yield by breeding, R. P. ELLIS (*Rel. Poultry Jour.*, 19 (1912), No. 2, pp. 263, 301-306).—This contains the views of a practical poultry-

man, who shows why, in his opinion, it is not practical to breed the 200-egg fowl.

Bacteriological studies of newly laid eggs, O. MAUREE (*Kansas Sta. Bul.* 180, pp. 360-396, figs. 2).—The object of these experiments was to determine the amount of infection in eggs and the factors influencing it during their formation. After some preliminary experiments to determine the number of bacteria in the egg, this work was given up and work limited to determine the number of eggs infected.

There was a tendency for the infected eggs to occur in small groups of 2, 3, or even 4, although there were cases where this tendency did not occur. No endeavor was made to express this tendency in more concise mathematical form, because only alternate eggs had been subjected to bacteriological examination, and because the number of eggs being laid outside the trap nests was quite large.

As the result of the experiments the following conclusions were drawn: "Eighteen and one-tenth per cent of the total number of eggs analyzed showed bacterial growth at room temperature, while only 8.3 per cent showed growth at blood temperature. Of the infected eggs, 82 per cent were infected in the yolk, 25.9 per cent in the white, and only 7.9 per cent in both white and yolk. The bacterial content of eggs undergoes great seasonal changes, generally increasing with the rise in temperature. No definite relation could be traced between the bacterial content of eggs and their hatching qualities. No relation could be found between the age of the fowls and the bacterial content of their eggs. No definite influence of the fattening ration upon the number of eggs infected and upon their hatching qualities could be observed."

A bibliography is appended.

The fertility of hen eggs, D. F. LAURIE (*Jour. Dept. Agr. So. Aust.,* 15 (1912), No. 7, p. 723).—Most of the eggs were found to be fertile until 7 or 8 days after the cock was removed from the pen. None were fertile after 17 days. **Contributions to the artificial incubation of fowls,** J. PAECHTNER (*Deut. Landw. Presse,* 39 (1912), Nos. 12, pp. 126, 127; 13, pp. 139, 140, figs. 9).—Tests made of an incubator, which is illustrated and described, are reported in detail.

How to raise chicks, P. T. WOODS (*Chicago, 1912,* pp. 123, figs. 33).—This book was written for the practical poultryman and covers the selecting, breeding, and management of fowls.

DAIRY FARMING—DAIRYING.

Practical lessons from the management of the university dairy herd, G. C. HUMPHREY and F. W. WOLL (*Wisconsin Sta. Bul.* 217, pp. 3-34, figs. 4).—This contains data on milk production of the dairy herd during the 2 years following the report previously noted (*E. S. R.,* 22, p. 677).

The average record for 22 cows was 7,978.2 lbs. of milk and 352.51 lbs. of fat in 1909-10, and 8,536.3 lbs. of milk and 354.77 lbs. of fat in 1910-11. The value of the products for the 2 years was \$121.71 and \$114.41, respectively. The net profit per cow was reduced from \$69.16 the first year to \$48.69 the second year, due to the lower prices for dairy products and the higher prices for feed. Over 1 lb. of milk fat and 24 lbs. of milk were produced daily per cow during the winter months.

High protein rations were less economical than medium protein rations. It is recommended that some high protein roughage, as alfalfa and clover hay, be available on every dairy farm in order to reduce the cost of rations. During the first weeks of pasturage the cows gained in production but lost in weight,

but it is thought that this loss can be reduced to a minimum by feeding hay or silage during the first few weeks on pasture.

The individual records of the cows, schedule of prices for feed, and other data are presented in tabular form.

The Illawarra dairy cattle, CAMDEN (*Pastoralists' Rev.*, 21 (1912), No. 12, pp. 1254, 1255, figs. 5).—An account of the methods of dairying in the Illawarra district of New South Wales.

There is also an account of the origin of a general purpose breed of cattle, known as the Illawarra, an association of which was formed in 1910. The requirement for registration is not pedigree, but in the case of cows is a record of performance. If a cow "has not more than 2 permanent teeth up she must yield at the rate of not less than 8 lbs. of commercial butter per week. With more than 2 teeth, and not less than 4, she must give at least 9 lbs.; with 4 teeth and not more than 6 she must give 10 lbs.; and a cow with more than 6 permanent teeth must make at least 12 lbs. of commercial butter per week. . . . The standard for bulls shall be that 4 of their progeny have qualified for the herd book, and that they score not less than 75 per cent of points on the scale of points approved by the association."

The cattle of Touraine, J. B. MARTIN (*Bul. Mens. Off. Renseign. Agr. [Paris]*, 11 (1912), No. 2, pp. 197-211).—This article discusses the breeds of cattle in Touraine, and gives records of the milk production and the work of the breeder's associations.

Bacteria as friends and foes of the dairy farmer, W. SADLER (*London, 1912*, pp. XV+112, pls. 4).—A small book on dairy bacteriology, written in a popular style for the producer and consumer of dairy products.

[Dairy investigations], **H. L. RUSSELL** (*Wisconsin Sta. Bul.* 218, pp. 26-30, fig. 1).—A brief report of progress at the station in making Cheddar cheese from pasteurized milk, the rôle of bacteria in ripening Cheddar cheese, manufacture of buttermilk cheese, the cause of mottles in butter, a new homogenizing device, improvement of the quality of the milk supply, and the distribution of dairy factories in Wisconsin.

Judging dairy products by points, M. A. O'CALLAGHAN (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 1, pp. 25-30).—This contains the score cards used in teaching students to judge milk, fresh cream for table use, cream for butter making, butter, and cheese.

A synthetic milk medium, H. A. WHITTAKER (*Amer. Jour. Pub. Health*, 2 (1912), No. 3, p. 162).—A method for preparing an artificial milk for use as a standard medium for exact bacteriological determination is described as follows:

"Fifteen gm. of pure caseinogen are dissolved in 100 cc. of a 1 per cent solution of sodium hydroxid in distilled water. Eighteen to 24 hours may be required for a complete solution. After the caseinogen is dissolved the solution is diluted to about 900 cc. with distilled water. Ten gm. of lactose and 0.1 gm. of calcium chlorid are added and the solution made up to 1,000 cc. with distilled water. It is then neutralized and made +0.3 with N/1 hydrochloric acid, using phenolphthalein as an indicator. This medium is sterilized in an autoclave at 107° for 20 minutes. The finished product should be a clear, transparent solution. When the medium has a reaction of +0.3 about 24 hours are usually required for coagulation with an active strain of *Bacillus coli*. When the reaction is neutral a somewhat longer time may be required to produce similar results. This medium has been thoroughly tested on the routine test for *B. coli* and apparently meets all requirements."

The food value of clean milk.—The demand for clean milk: The reasonableness of it, R. M. WASHBURN (*Agr. of Mass.*, 53 (1910), pp. 47-63).—It is

pointed out that milk has not been estimated by the consumer at its full value as a food. Many suggestions are given for the production of pure milk.

Ozone and the sterilization of milk. W. P. BLISS (*Jour. Meat and Milk Hyg.*, 1 (1911), Nos. 6, pp. 324-330; 7, pp. 400, 401; 9, pp. 505-508; *Rev. Gén. Lait*, 8 (1911), Nos. 22, pp. 505-515, fig. 1; 23, pp. 532-539; 24, pp. 553-559).—Milk treated with ozone acquired an unpleasant taste, which could not be reduced except to a trifling extent by aeration. Ozone delayed curdling, and the length of time which elapsed between the curdling of the raw specimen and the ozonized milk increased roughly as the concentration increased. In general slow ozonization was of more value than fast ozonization.

Bacterial counts showed that ozone destroyed an appreciable number of the bacteria, on the average about 40 per cent, but too low a percentage to be considered efficient in preserving milk. The remaining bacteria are apt to grow faster than those in the untreated samples, so that although at first the numbers may be reduced 40 per cent, in 24 hours they may be as high as, or higher than, in the raw milk.

"The marked irregularity in the results of the experiments proves that the preservation of the milk depends upon the nature of the milk rather than the amount or concentration of the ozone, and that ozonization can not be depended upon to produce definite increase in this length of preservation."

The utilization of skim milk. C. KNOCH (*Die Magermilch-Verwertung in den Molkerereien*, Leipzig, 1912, 2. ed., rev. and enl., pp. IX+249, figs. 42).—This book treats of the methods of testing skim milk, the economic significance of skim milk, and methods of manufacture into other products. The methods of using skim milk for making kefir, yoghourt, milk cognac, milk chocolate, margarin cheese, ziger, milk bread, diastasin, and milk-molasses stock feeds are described. Details are given for manufacturing milk sugar, condensed milk, powdered milk, butterine, and many patented products such as galalith, casein cement, casein lime, casein plaster, an imitation of amber, shoe polish, plasmon, nutrose, sanotogen, casein soap, and material used for insulating.

Kefir and yoghourt. M. HOHENADEL (*Pharm. Zentralhalle*, 52 (1911), Nos. 50, pp. 1337-1342; 51, pp. 1371-1378; 52, pp. 1401-1404).—This article describes the methods of preparing kefir, yoghourt, and other fermented milks, and discusses their dietetic and therapeutic values.

Kefir (*Merck's Ann. Rpts.*, 24 (1910), pp. 39-63; *Merck's Arch.*, 13 (1911), No. 12, pp. 339-395; 14 (1912), No. 1, pp. 14-18).—This describes different methods of preparing kefir. A bibliography is appended.

The chemical composition of Mecklenburg butter in the years 1899-1903, and 1910-11. W. D. KOOPER (*Ztschr. Untersuch. Nahr. u. Genussmittel*, 23 (1912), No. 5, pp. 198-205).—A large number of analyses showed that there were seasonal variations. Butter made in summer had a higher fat content and iodine number, and a lower Reichert-Meisss number and a smaller percentage of solids-not-fat, than winter butter.

Varieties of cheese. C. F. DOANE and H. W. LAWSON (*U. S. Dept. Agr., Bur. Anim. Indus. Bul.* 146, pp. 78).—This is a revision of a bulletin previously noted (*E. S. R.*, 20, p. 181). A few additional varieties of cheese have been included.

The present position of the cheese ripening problem. O. JENSEN (*Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, pp. 202-209; *Molk. Ztg. Berlin*, 22 (1912), Nos. 12, pp. 133, 134; 13, pp. 145, 146).—This is a lecture given at the Fifth International Dairy Congress at Stockholm, and consists of a summary of investigations on the ripening of cheese.

The cheese of Forez and D'Ambert. ARDOUIN-DUMAZET (*Jour. Agr. Prat.*, n. ser., 21 (1911), No. 26, pp. 811-813).—The typical cheeses made in the depart-

ment of Puy-de-Dôme, which are known as "fourmes du Forez et D'Ambert" are cylindrical in shape and 25 cm. long by 13 cm. in diameter. The dairy methods used in making these cheeses are extremely primitive. A peculiarity is the method of ripening, which is accomplished by placing the cheeses on the ground in a cellar and covering them with earth, over which spring water is allowed to flow. Molds develop in the earth causing many of the cheeses to deteriorate in quality and to become unfit for export. The inside cuts of the best cheeses have an appearance and taste quite similar to Roquefort, but are not so dry as Septmoncei and Sassenage made in the southwest of France.

Swiss cheese exports in 1910, L. VON HENNET (*Mitt. Fachberichterstat. K. K. Ackerb. Min. [Vienna], 1911, No. 7, pp. 54, 55; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 6, p. 1417*).—Statistical data on the exports of cheese, most of which is sent to France, the United States, and Germany. The exports to Italy have declined in the past few years owing to the development of dairying in northern Italy.

VETERINARY MEDICINE.

Immunity, J. CITRON, trans. by A. L. GARRAT (*Philadelphia, 1912, pp. XIII+209, pls. 2, figs. 27*).—This publication deals with the methods of diagnosis and therapy and their practical application, and considers chiefly the human aspect. Among its contents are the following: Laboratory equipment, active immunity, tuberculin diagnosis, tuberculin therapy, toxin and antitoxin, the toxins of the higher plants and animals and their antibodies, ferments and antiferments, agglutination, precipitins, bacteriolysins and hemolysins, method of complement fixation, technique of the complement fixation method, phagocytosis, opsonins and bacteriotropins, and passive immunity.

Immunity, protective vaccination, and serum-therapy, A. DIEUDONNÉ (*Immunität, Schutzimpfung und Serumtherapie. Leipzig, 1911, 7. ed., rev., pp. VII+243, figs. 5*).—This is the seventh revised edition of this work (E. S. R., 23, p. 481).

Experimental bacteriology and the infectious diseases, with particular regard to immunity, W. KOLLE and H. HETSCH (*Die Experimentelle Bakteriologie und die Infektionskrankheiten, mit besonderer Berücksichtigung der Immunitätslehre. Berlin and Vienna, 1911, vol. 1, 3. ed., rev. and enl., pp. XVI+496, pls. 49, figs. 68*).—This is the first volume of the third revised and enlarged edition.

Experimental bacteriology and infectious diseases, W. KOLLE and H. HETSCH (*Die Experimentelle Bakteriologie und die Infektionskrankheiten. Berlin and Vienna, 1911, vol. 2, 3. ed. enl., pp. VII+497-968, pls. 49, figs. 111*).—This is the second volume of this text-book, which deals with diphtheria, tuberculosis, botulism, ulcus molle, infections caused by the *Bacillus pyocyaneus*, hemorrhagic septicemia of animals, hog cholera, swine plague, swine erysipelas, diseases caused by spirochetes, syphilis, the most important morphological and biological characteristics of protozoa, amoebic dysentery, flagellate infections particularly trypanoses, coccidial diseases, malaria, piroplasmoses, rabies, foot-and-mouth disease, pox in man and animals, mold fungi and budding fungi, ankylostomiasis, trichinosis, filariasis, and critical remarks in regard to the etiology of some infectious diseases of which the cause has not been discovered. An appendix is included which deals with the cultivation of bacteria, the most important staining methods, and methods for fixing and imbedding tissue.

Manual of bacteriology, R. MUIR and J. RITCHIE (*London, 1910, 5. ed., pp. XXIII+688, pls. 6, figs. 174*).—This is the fifth edition of this well-known work, which has been brought up to date.

The yearly report of the progress made in the field of the pathogenic micro-organisms, edited by P. von BAUMGARTEN and W. DIBBELT (*Jahresber. Path. Mikroorgan.*, 24 (1908), pp. XII+1186).—This is a review of the literature issued in the year 1908 on bacteriology and protozoology.

Report of the fifteenth annual meeting of the United States Live Stock Sanitary Association (*Rpt. U. S. Live Stock Sanit. Assoc.*, 15 (1911), pp. 491).—Among the more important papers presented in this report are the following: Bovine Tuberculosis, Its Problems and Control (pp. 51-50), by V. A. Moore; New Methods of Tuberculin Testing (pp. 56-62), by K. F. Meyer; Tuberculosis—Summary of Methods and Results to Date, with Suggestions (pp. 76-78), by A. D. Melvin; Dourine in Horses, Covering Investigations in Iowa (pp. 79-83), by A. W. Miller; The Cattle Fever Tick Proposition (pp. 106-111), by E. M. Nigbbert; Infectious Abortion in Cows and Mares (pp. 114-120), by E. S. Good; Outline of Experimental Work on Infectious Abortion of Cattle (pp. 120, 121), by W. Giltner; Contagious Abortion of Cattle (pp. 121-123), by W. P. Larson; Treatment of Hog Cholera with Attenuated Virus (pp. 125, 126), by A. T. Peters; Researches on Hog Cholera (pp. 129-135), by M. Dorset; Hog Cholera—V. B. Vaccination (Virulent Blood) (pp. 135-140), by M. H. Reynolds; and Report on the Nomenclature of Swine Diseases (pp. 142, 143), by V. A. Moore et al.

The following papers are presented in the appendix: Serum Diagnosis of Glanders and Other Animal Diseases (pp. 165-172), by J. R. Mohler; Rabies (pp. 172-175), by S. W. Ward; Control of Glanders in Minnesota (pp. 175-178), by C. E. Cotton; The Probable Influence of the Open Water Trough in the Spread of Glanders (pp. 178-181), by A. T. Kinsley; Further Report on Arsenical Dips as Remedies for Cattle Ticks (pp. 181-186), by B. H. Ransom; and Experience in Eradicating Tuberculosis from a Herd (pp. 186-188), by N. S. Mayo.

Some of the features of sanitary police work as applied in the federal quarantine service, R. N. HICKMAN (*Amer. Vet. Rev.*, 40 (1912), Nos. 5, pp. 591-600; 6, pp. 748-756).—A paper presented at the forty-eighth annual convention of the American Veterinary Medical Association, held at Toronto, August, 1911.

Clinical diagnostics of the internal diseases of domestic animals, B. MALCMUS (*Chicago, 1912*, 4. ed., pp. X+259, pl. 1, figs. 57).—This is a translation by D. S. White and P. Fischer of the fourth revised and enlarged edition of the author's *Grundriss der Klinischen Diagnostik*.

The subject is taken up as follows: The diagnosis of diseases (pp. 11-17), anamnesis (pp. 18-20), method of examination (pp. 21-30), general part of the examination (pp. 31-74), special part of the examination (pp. 75-221), and specific examinations (pp. 221-251).

*The animal parasites of cattle and wild animals recorded as occurring in the Belgian Kongo (*Bul. Agr. Congo Belge*, 2 (1914), Nos. 1, pp. 116-120; 3, p. 427).—This list, arranged by districts, records the locality and hosts of animal parasites of the Belgian Kongo.

The hydrocyanic acid content of three varieties of *Andropogon*, J. SCHRÖNER and H. DAMMANN (*Chem. Ztg.*, 35 (1911), No. 155, pp. 1436, 1437).—The varieties here discussed are *A. sorghum saccharatum*, *A. sorghum vulgaris*, and *A. sorghum halepensis*. The experiments reported were carried on in Uruguay, following the loss of cattle which had been fed upon sorghum.

The plants were cut at different periods in their growth and chemical analyses made to determine the hydrocyanic acid content with the result that all 3 varieties were found to contain it during the growing period. The content diminished with the growth of the plant and none was found in the seeds.

The application of nitrate of soda was found in nearly all cases to increase the amount of hydrocyanic acid present. In drying the plants a part of it disappeared so that the straw contained less than the green plants.

Amount of hydrocyanic acid in sorghum at different periods of growth.

Date.	Height of plant (unfertilized).	Period of growth.	Hydrocyanic acid content.			Stage of cutting.
			In unfertilized plants.	In plants fertilized with nitrate of soda.	Increase through application of nitrogen.	
<i>A. sorghum saccharatum.</i>						
Dec. 2, 1910.....	Cm. 20	Days. 44	Per cent. 0.0293	Per cent. 0.0414	+ 0.0121	
Dec. 20, 1910.....	60	62	.0211	.0314	+ .0103	Dry.
Jan. 26, 1911.....	100	99	.0057	.0039	— .0018	Beginning to bloom.
Feb. 15, 1911.....	110	119	.0048	.0052	+ .0004	Blooming.
Mar. 3, 1911.....	129	135	.0013	.0044	+ .0027	Beginning to seed.
Mar. 24, 1911.....	130	156	.0028	.0048	+ .0020	Withering.
<i>A. sorghum vulgaris.</i>						
Dec. 2, 1910.....	40	44	.0182	.0366	+ .0174	
Dec. 20, 1910.....	60	62	.0176	.0243	+ .0067	Dry.
Jan. 30, 1911.....	100	103	.0065	.0071	+ .0006	Beginning to bloom.
Feb. 16, 1911.....	130	120	.0053	.0059	+ .0006	In full bloom.
Mar. 3, 1911.....	140	135	.0025	.0056	+ .0031	Beginning to seed.
Mar. 24, 1911.....	140	156	.0054	.0026	— .0028	Withering.
<i>A. sorghum halepensis.</i>						
Dec. 27, 1910.....	20	44	.0137	.0212	+ .0075	Dry.
Jan. 27, 1911.....	30	74	.0036	.0052	+ .0016	Beginning to bloom.
Feb. 16, 1911.....	60	94	.0023	.0032	+ .0024	In full bloom.
Mar. 3, 1911.....	60	109	.0040	.0056	+ .0016	Beginning to seed.
Mar. 27, 1911.....	60	130	.0028			Ripe.
Dec. 28, 1910.....	40		.0005			Plants in second year.
Dec. 28, 1910.....			.0003			Do.

The toxic effects of three varieties of *Andropogon*, J. SCHÜBEN and H. DAMMANN (*Agros*, 2 (1911), No. 10, pp. 283-290).—This paper relates to the studies of *Andropogon sorghum saccharatum*, *A. sorghum vulgaris*, and *A. sorghum halepensis*, as noted above.

Some studies on cotton-seed meal poisoning, C. W. EDEGTON and H. MORRIS (*Louisiana Stas. Bul.* 134, pp. 3-35).—This is a report of investigations, which have extended over a period of more than 2 years, from which the following conclusions are drawn:

"Cotton seed and cotton-seed meal does contain a toxic principle which is poisonous to certain animals. Cotton seed, itself, seems to be more toxic than the ordinary commercial cotton-seed meal. Different lots of cotton seed and cotton-seed meal show a considerable variation in toxicity.

"The toxicity of the cotton-seed meal does not seem to be affected by the fungi which rot the cotton bolls and enter the cotton seed. Cotton seed from plants affected with the cotton wilt, or black root disease, are less toxic than cotton seed from healthy plants. This decrease in toxicity in this seed is not due to the premature ripening of the seed, because seed ripened on plants that had been cut down showed as much toxicity as seed from healthy, uninjured plants.

"Heating cotton-seed meal or cotton-seed kernels for a long period at a high temperature decreases the toxicity to a considerable extent. A very short heating of the cotton-seed kernels, followed by an extraction of the oil, apparently does not decrease the toxicity. Another factor enters here, however,

which must be considered. "This heated meal is much more palatable than the raw kernels and animals eat considerably more of it. Animals make better gains on this meal than on the kernels, though they die as soon, or even sooner, than animals on the raw kernels.

"The heating to which the kernels are subjected in the oil mill is probably sufficient in most cases to reduce the toxicity to some extent, though this reduction is usually not enough to remove all danger from feeding susceptible animals.

"The careful fermentation of the kernels or meal seems to reduce the toxicity to a considerable extent.

"All the cotton varieties that were tested that were grown on the same plot of ground during the same season, showed no difference in the toxicity.

"Sea Island seed obtained from Porto Rico was extremely toxic.

"We have no evidence whatever to show that pyrophosphoric acid has anything to do with cotton-seed meal poisoning."

Reference is made to the investigations of Crawford, previously noted (E. S. R., 22, p. 502).

On the action of *Senecio* alkaloids and the causation of hepatic cirrhosis in cattle, A. R. CUSHNETT (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 570, pp. 188-190*).—This is a preliminary report of experiments with the 2 alkaloids found in *Senecio latifolius*, made chiefly upon cats.

"The symptoms induced are of 2 kinds, acute, and subacute. The acute symptoms commence with nausea and salivation, extremely accelerated respiration, and, somewhat later, violent clonic convulsions under large doses. These acute symptoms generally pass off in the course of 2 or 3 hours, and the animal appears perfectly well very often for the next 2 or 3 days or longer. Some loss of weight may occur during this time, and then the subacute symptoms are introduced by a stool of rather loose consistency, loss of appetite, and in some cases vomiting. The animal then becomes weak and disinclined to move, and passes into a condition of apathy, stupor and coma, death following by failure of the respiration. These later symptoms succeed each other rapidly, death occurring within 24 to 48 hours after the first subacute symptoms. . . .

"Post-mortem appearances varied a good deal in different animals. There was often found an unusual amount of fluid in the abdominal cavity, sometimes of a bright yellow color. Small ecchymoses were sometimes found in the omentum, and fat deposits in the abdomen. The stomach contained black masses of half-digested blood, and the duodenum also contained some effused blood-mixed with mucus. The liver was swollen and congested, and the gall bladder was generally distended with very dark colored viscous bile, which could only be expressed from it with difficulty. Small hemorrhages were often found in the lungs, pancreas, kidney, and some other organs. . . . In chronic poisoning no symptoms, except loss of weight, were elicited until the drug had been given for over a month. . . . The animal then died with the same appearances as in subacute poisoning. . . . The 2 alkaloids sent to me induced the same symptoms and the same changes, and seem to be equally toxic."

A study of the renal epithelium in various types of acute experimental nephritis and of the relation which exists between the epithelial changes and the total output of urine, W. DE B. MACNIDER (*Jour. Med. Research, 26 (1912), No. 1, pp. 79-126, pls. 4*).—"From the experimental data presented in this investigation the following conclusions appear allowable:

"Cantbaridin, potassium dichromate, uranium nitrate, and sodium arsenate produce in the dog an acute nephritis in which both the vascular and the epithelial elements of the kidney are involved. The histological study shows that the vascular element of the kidney is first affected and that the rapidity

with which the epithelium is involved depends principally upon the nephrotoxic substances employed in producing the nephritis. Uranium nitrate and potassium dichromate usually produce a tubular nephritis much earlier than either cantharidin or sodium arsenate.

"In the early stages of the nephritis from these poisons, when there is anatomical evidence of vascular injury and either slight or no anatomical evidence of epithelial injury, the output of urine is increased. Later in the nephritis, when histologically the vascular pathology may not be increased in severity but when the epithelium has become involved, the output of urine is reduced or an anuria is established. Those nephrotoxic substances which have the most marked affinity for the tubular epithelium are the substances which most rapidly cause either a reduced output of urine or an anuria, while those nephrotoxic substances, such as arsenic, which cause an early and a pronounced vascular injury, with late epithelial involvement, are the poisons which have the least tendency to produce an anuria.

"In the experiments detailed in this study which have shown either a pronounced decrease in the output of urine or an anuria, there have constantly been associated epithelial changes, which would produce in different degrees an obstruction of the lumen of the tubules. In those experiments in which the output of urine has not been decreased, and in those experiments in which the output of urine was increased beyond the normal, such epithelial changes either did not exist or they were histologically slight."

The precipitation reaction for anthrax, HOASTETTER (Berlin. Tierärztl. Wchnschr., 28 (1912), No. 7, pp. 117-119, figs. 2).—The chief difference between Ascoli's test (E. S. R., 26, p. 375) and Pfeiffer's reaction lies in the fact that in the first named the precipitating reagent is prepared by heating the suspected material in a boiling water bath for a few minutes with physiological salt solution, and in the latter the material is rubbed up with chloroform and porcelain sand and extracted with carbolized salt solution. The latter method has the disadvantage of requiring about 7 hours for the preparation of the extract, but with the former the reaction is not so intense.

The diagnosis of anthrax by the Ascoli reaction, A. LEBAR (Arch. R. Inst. Bact. Camara Pestana, 3 (1912), No. 3, pp. 379-397, figs. 7).—This reaction (E. S. R., 26, p. 375) furnished very satisfactory results, even when the material to be tested was putrid.

Aggressin immunization against symptomatic anthrax, O. W. SCHÖBL (Abd. in Science, n. ser., 35 (1912), No. 893, p. 237).—Briefly, the results of the experiments are as follows: The existence of aggressin in blackleg edema has been proved, since the sterile edema fluid aids infection by hindering the natural protective apparatus of the organism. Phagocytosis chiefly is inhibited. It is nontoxic even in much larger quantities than the amount necessary to change a sublethal dose of symptomatic anthrax bacilli into the lethal dose. Repeated injections of sterile edema fluid leads to a considerable degree of immunity. The animals are not only immune themselves, but also yield serum that protects normal animals from subsequent infection. Such a serum shows the presence of antibodies demonstrable both in vitro and in vivo, the most striking characteristic being its favorable effect upon the phenomenon of phagocytosis.

"In the subcutaneous circumscribed infiltration following artificial infection, immunized animals may under certain circumstances harbor virulent symptomatic anthrax bacilli. Therefore, the immunity can not be considered bacteriolytic. The immunity consists of a complete or partial inhibition of the growth of symptomatic anthrax bacilli in the body of the immunized animal. If the immunity is not sufficient to suppress completely the growth of bacilli, they multiply locally and are still able to produce toxin. The difference

between antitoxic and antinfected immunity is in the case of symptomatic anthrax quite evident. The fact frequently observed in the experiments that immune animals may harbor in their bodies symptomatic anthrax bacilli, fully virulent for normal animals, is worthy of consideration from an epidemiological standpoint.

"The method of immunization with aggressin is advantageous in that the inoculating material is a sterile fluid, hence the danger of making bacillus carriers or setting up a virulent infection through the vaccinating material is avoided."

Anthrax and tick fever, W. H. DALRYMPLE (*Amer. Vet. Rev.*, 40 (1912), No. 6, pp. 757-764).—This is a continuation of the paper previously noted (*E. S. R.*, 26, p. 678), and deals with Texas or splenic fever, and the cattle tick and its eradication.

Vaccination against blackleg in Bavaria, T. KITT (*Ztschr. Infektionskrankh. u. Hyg. Haustiere*, 9 (1911), No. 1-2, pp. 99-119).—Vaccination against symptomatic anthrax has been carried on for the last 20 years in Bavaria. The vaccine used in most instances was prepared by heating with live steam the powdered muscle of animals affected with blackleg. A table is given taking in the years 1898 to 1909, inclusive, which gives the number of vaccinated and unvaccinated animals, and the mortality statistics in each case. The mortality in the case of the vaccinated animals was very low.

In addition to these some tests are reported in regard to the preparation of vaccine for blackleg free from living spores, and the author points out some of the disadvantages which are encountered in sterilizing vaccine according to the various methods.

The viability of human carcinoma in animals, C. L. WILLIAMS (*Proc. Roy. Soc. [London]*, Ser. B, 84 (1911), No. B 570, pp. 191-195).—"Portions of human carcinoma implanted into animals were observed during the first 5 days to retain their vitality and to exhibit mitoses after implantation. After the expiration of this period no evidence of vitality was observed. Mitosis was markedly inhibited within 24 hours of implantation, while the life of the implanted cells was abolished less rapidly."

In regard to the behavior of Wassermann's reaction with rabbits affected with dourine, F. M. MEYER (*München. Med. Wchnschr.*, 58 (1911), No. 44, pp. 2318, 2319; *abs. in Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 7, p. 127).—The Wassermann reaction (complement fixation reaction for syphilis) was positive in from 1 to 4 weeks after infection. In some cases the reaction was present before the symptoms.

Experiences and observations in regard to combating foot-and-mouth disease by Steffen's method, N. MEYER (*Illus. Landw. Ztg.*, 32 (1912), No. 9, pp. 66, 67).—This treatment consists of dusting yeast powder in the blebs and erosions of the buccal cavity and the use of yeast ointment for the foot lesions. The results obtained with the method were comparatively good.

Foot-and-mouth disease, B. BANO (*Jour. Compar. Path. and Ther.*, 25 (1912), No. 1, pp. 1-15).—A paper read before a meeting at the Royal Veterinary and Agricultural College, Copenhagen, on October 16, 1911.

The precipitin-diagnostic reaction for glanders in horses, S. COSTA and A. FAYET (*Compt. Rend. Soc. Biol. [Paris]*, 70 (1911), No. 4, pp. 147, 148).—The results show that Miessner's and Panisset's reactions can be obtained when mallein is injected into sound horses. This property may persist for at least 24 hours.

Trypanosomes found in Canadian mammals, E. A. WATSON and S. HADWEN (*Parasitology*, 5 (1912), No. 1, pp. 21-26, pls. 2).—The species described as new are *Trypanosoma leporis-sylvaticus*, found in the cotton-tail bush rabbit

(*Lepus sylvaticus*), at Lethbridge, Alberta; *T. peromysci*, found in northern deer mice (*Peromyscus maniculatus*, *P. nebracensis*, and other species) at Lethbridge; *T. citelli*, found in the ground squirrel (*Citellus richardsoni*), at Lethbridge; *T. rutherfordi*, found in the blood of a cow at Mount Lehman, British Columbia; *T. evotomys*, found in a vole (*Evotomys saturatus*) at Mount Lehman; and *T. soricis*, found in the blood of a wandering shrew (*Sorex vagrans*) at Mount Lehman.

Trypanosoma americanum, a common blood parasite of American cattle, H. CRAWLEY (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 145, pp. 39, figs. 15*).—This is a report of studies of the nonpathogenic trypanosome described by the author in a bulletin previously noted (*E. S. R.*, 22, p. 281).

A résumé of the literature, first presented, is followed by reports of (1) the examination of cultures, including seasonal variation in the number of trypanosomes in blood, effect on the trypanosomes of keeping the blood before cultures were made, results obtained with measured quantities of blood, and general results of cultural work; (2) observations on fresh material, including attempts to discover the trypanosomes in freshly drawn blood, evolution of the trypanosomes in culture, movements of trypanosomes in cultures, the process of multiplication, and motility of the trypanosomes; and (3) observations on fixed material, including morphology of the forms in the blood and in culture, and cytology of the forms in culture.

The conclusions drawn are as follows: "*T. americanum* lives, in all probability as a typical trypanosome, in the blood of perhaps 75 per cent of yearling and adult American cattle, but is not present in young calves. It comes very close to *T. wrubilevski* of the European bison, and may be only a variety of that species. Removal from the circulating blood stimulates multiplicative energy, apparently merely as the result of a cooler environment. Removed from the cow and placed under appropriate conditions, multiplicative energy runs far in advance of growth energy; hence the trypanosomes divide and redivide very rapidly, and in consequence become smaller than the blood forms. At the end of a few days, multiplicative energy weakening, the organisms have an opportunity to grow and to reach their normal size. The adults are at first very slender, but in time increase in breadth and may become very large. As the cultures reach and pass their maxima the individuals become club-shaped and eventually transform into rounded or oval elements, provided each with a long flagellum.

"Changes in the morphology of the nuclear system, and in the texture and chemical nature or composition of the cytoplasm, accompany changes in the faces of the entire organism. A distinguishing character is the situation of the trypomastix, which is normally at the union of the anterior and middle thirds."

A bibliography of 13 titles is appended.

The infection of mules by *Trypanosoma hippicum* through mucous membranes, S. T. DARLING (*Jour. Expt. Med.*, 15 (1912), No. 4, pp. 367-369).—The experiments with mules here reported indicate positively that *T. hippicum* can penetrate the mucosa of mules. From this it is assumed that murrina may be transmitted during copulation. It is stated that the disease, which has been eradicated in the Canal Zone, is still present in parts of the Republic of Panama in villages and along the trails, and that cases have been detected in native ponies near the zone line.

Investigations in regard to tuberculosis in milch cows, G. COSCO (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 61 (1911), No. 1-2, pp. 59-63).—Tuberculosis may be conveyed from one bovine to another by the agency of the feces, which contains the specific living and virulent organism. Some cows, which to all

appearances have sound udders, eliminate tubercle bacilli with the milk. No tubercle bacilli could be detected in the urine. The above results were obtained with 9 bovines.

Nontuberculous milk in Guernsey. H. D. BISHOP (*Brit. Med. Jour.*, 1912, No. 2665, p. 217).—"Until 1906 tuberculosis was apparently unknown amongst Guernsey cattle, but it was then introduced by cattle reimported after having been to England for exhibition. This reimportation is now forbidden and drastic laws have been passed compelling the slaughter of all infected cattle, and granting state compensation. As a result the disease has been practically stamped out, and of the 1,364 animals exported during the past 3 years, all of which were treated with tuberculin, only 6 were found to be affected. . . .

"The forms of human tuberculosis chiefly caused by bovine tuberculosis (tuberculous glands of neck, abdominal tuberculosis, and lupus) are consequently exceedingly rare in the island of Guernsey."

In regard to the course of bovine tuberculosis. C. TITZE (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 6, pp. 98-101).—A detailed description of the cycle of tuberculosis from the time of infection to either the death of the animal and its offspring, or to the resolution of the tuberculous process.

In regard to detecting pulmonary tuberculosis in bovines. O. MÜLLER (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 10, pp. 179-183).—A discussion in regard to the various existing methods of catching sputum from bovines for the purpose of diagnosing pulmonary tuberculosis. Tests with sound and tubercular bovines showed that the method devised by the author, and similar to that of Scharr and Opalka (*E. S. R.*, 26, p. 679), is of value.

The tuberculin test; its value and proper uses. J. LAW (*Tribune Farmer* [N. Y.], 40 (1912), No. 537, pp. 1, 2, figs. 2).—This article deals with the factors which influence the value of the tuberculin test, and discusses its present status.

On a nematode in the connective tissue of bovines. M. PIETTER (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 9, pp. 620-623).—The frequent finding of calcareous deposits about the femoro-tibial articulation led the author to conduct the investigations here reported.

The lateral and capsular ligaments were found to be invaded by a filarial parasite, to which the name *Onchocerca bovis* has been given. It occurs only in fibrous tissue and almost exclusively in the thick part of the lateral and capsular tendons of the femoro-tibio-patellar articulation. The external ligament is more often invaded than is the internal. The external tibio-tarsal ligament was found to be invaded in one instance but never the cervical ligament.

This parasite is of importance pathologically because of the disorders which it causes at the place of articulation of the tendons and the resulting peri-arthritis.

Onchocerciasis in imported meat. H. WILLIAMS (*Pub. Health* [London], 25 (1911), No. 1, pp. 8-10).—It is stated that on a minute examination made on cutting up a number of flanks and briskets the percentage of *Spiroptera reticulata* infestation of meat arriving in England from Australia was found in many cases to be over 80, and in some cases to reach 100. This infestation is of increasing importance, since the quantity of frozen meat arriving in England from Australia is greatly exceeding that of previous years.

"When the first consignment was examined, it was thought that this parasite existed only on the surface, but a more careful examination of subsequent consignments revealed the fact that it was also to be found embedded in the deeper connective tissues, especially on the flanks and briskets. . . . The hind quarters, on careful examination, were also found to be affected, chiefly in the vicinity

of the stifle or knee joint, and a few scattered nodules on the surface of the meat. The percentage found affected is also very high, as will be seen from the following examination of the consignments from only 2 vessels. Of 4,617 hind quarters examined, 2,839, or 61.49 per cent, were found to contain the parasite *S. reticulata*. Of 805 hind quarters examined, 564, or 70 per cent, were found to be affected. . . . The worm in the hind quarters is generally situated deeply, requiring considerable cutting in order to find the worm and, when found, to insure that the whole of the worm, with the surrounding tissues, has been removed."

It is stated that the Commonwealth of Australia has instituted a rigorous system of inspection of beef for export and that in the future all flanks and briskets from fore quarters will be cut off before being allowed to leave the country.

The inheritance of spirochetal infection in *Argas persicus*, E. HINDLE (Proc. Cambridge Phil. Soc., 16 (1912), No. 6, pp. 457-459).—The experiments reported indicate clearly that once a tick becomes infected with *Spirochaeta gallinarum* its offspring of the first generation is infective in all its stages, and moreover that the infection is transmitted to the second generation. "It is evident, therefore, that once the Argas of any locality become infected with spirochetosis it will be very difficult to eradicate the disease."

Investigations relative to arsenical dips as remedies for cattle ticks, B. H. RANSOM and H. W. GRAYBILL (U. S. Dept. Agr., Bur. Anim. Indus., Bul. 44, pp. 65, pls. 6, fig. 1).—This bulletin reports the details of 22 dipping experiments of which 12 were with arsenic, soda, and pine-tar dips; 1 with arsenic, soda, and pine-tar dip containing emulsified crude petroleum; 2 with arsenic and zinc sulphate dip; 2 with arsenic-alum dip; 1 with sodium arsenate dip; 1 with sodium sulpharsenite dip; 2 with potassium arsenite dip containing soap; and 1 with repeated applications of the arsenic, soda, and pine-tar dip. In most of the experiments the arsenical solution used was a modification of the Mayo formula, the amounts of arsenic varying from 8 to 12 lbs., and of sal soda from 24 to 45 lbs., for each 500 gal. of dip, in different instances. When pine tar was used it was added in the proportion of 1 gal. to each 500 gal. of dip. In some of the experiments arsenical dips of somewhat different composition were used. The amount of arsenic in solution in the various dips, expressed in its equivalent of arsenic trioxid, varied from 0.16 to 0.495 per cent.

"The effects of the dips upon the cattle in the various experiments were almost invariably slight. . . . Cattle not infested with ticks, dipped repeatedly in a dip containing an equivalent of about 0.22 per cent arsenic trioxid at intervals of 2 and 3 weeks gained less in weight than other uninfested cattle kept under the same conditions undipped, but it is uncertain whether this difference was due to the dipping. In all cases in which cattle were dipped or sprayed once or twice in arsenical dips containing an equivalent of from 0.16 to 0.24 per cent arsenic trioxid the injurious effects observed were confined to the action of the dips upon the skin, and scarcely ever was this action more than very mild, though in some cases the animals were treated in hot weather when the injurious effects from dipping are especially likely to appear. The signs of the effects of dipping on the skin in various instances became evident in from 3 to 9 days after the treatment, at which time a more or less well-marked epidermal exfoliation or dandruff-like peeling of the superficial layers of the skin appeared, confined as a rule to the dewlap, neck, escutcheon, inner side of thighs, and scrotum. No marked inflammation preceded the exfoliation, though occasionally, a slight irritation of the skin in places was observed."

The authors conclude that "cattle may be safely dipped or sprayed with arsenical dip containing an equivalent of 0.24 per cent arsenic trioxid or less,

and the treatment once repeated 7 or more days later, the only injury to be expected as a rule being more or less epidermal exfoliation, and sometimes slight soreness or tenderness of the skin, local in character."

The experiments fully confirmed the observations of various investigators and practical users of arsenical dips who have found that ticks are very sensitive to arsenic. Little is known, however, as to the avenue by which the arsenic enters the body of the ticks. After treatment with an arsenical dip the vast majority of the young adult females die before they reach the engorged stage, and the younger they are the less likely are they to survive and become engorged.

"In 6 experiments the cattle were found to be free from engorged ticks 3 to 5 days after the first treatment, in 4 other experiments they were free 7 to 9 days after treatment, in another they were nearly free 5 days after treatment, in another experiment all that were examined were free from engorged ticks 8 days after treatment, and in 2 other experiments the cattle were nearly free from engorged ticks 8 days after treatment."

In order to obtain data bearing upon the question of the fate of ticks which reach engorgement and fall from cattle subsequent to dipping, engorged ticks were collected from the cattle in the various experiments immediately after treatment and on successive days thereafter and kept under observation. "Whereas in many of the lots from treated cattle all of the ticks died without ovipositing, in most cases some of the ticks deposited eggs, the percentage of ticks ovipositing usually being low, although in rare instances as high as 100 per cent." Ticks from treated cattle which survived to deposit eggs nearly always deposited a much smaller number than ticks from untreated cattle, and moreover, they rarely hatched. Out of approximately 70 lots of ticks from treated cattle, only 4 lots deposited eggs which hatched.

"Judging from these results it would appear that the hatching of eggs deposited by ticks which survived treatment with arsenical dips is a rather rare occurrence. Furthermore, it has been noted that the larvæ from eggs deposited by females which have been subjected to arsenical solutions are frequently in such a weakened condition that they can not emerge from the eggshell, or they may become lodged in the opening of the ruptured shell and fail to extricate themselves, or show such slowness of movements after emerging as to make one believe that they could not effect a successful attachment after reaching a host, a condition of the larvæ which has also been noticed in the case of eggs subjected to unfavorable conditions, such as low relative humidity and low temperatures."

The data relative to the ticks removed from cattle after treatment and their corresponding control from untreated cattle, and to engorged ticks dipped in the laboratory, are presented in tabular form.

"Very few male ticks were found alive on cattle later than a day or two after treatment, and it is probable that most of these were ticks which were in the nymphal stage at the time of treatment. It may therefore be concluded that arsenical dips are highly efficacious so far as the destruction of male ticks is concerned. . . . The vast majority of nymphs were killed by a single treatment. In several experiments, however, some of the nymphs survived and afterwards molted. . . . No instance was observed in any of the experiments of the survival of ticks in the larval stage after a single treatment with an arsenical dip."

The bulletin concludes with a discussion of the practical significance of results of experiments with arsenical dips, taking up the composition of the dip, method number, and frequency of applications, and handling the cattle.

A plan is given for a draining pen for cattle after dipping.

Parasitic gastritis of sheep, E. G. HASKELL (*Vet. Rec.*, 24 (1912), No. 1229, pp. 473-475).—It is stated that flocks of sheep in certain parts of the south-west of England have suffered severely from parasitic gastritis, due to *Strongylus cervicornis*, and that the mortality is still continuing. In west Somerset the greatest number of deaths was observed among ewes of all ages, though lambs a year old were also affected.

The thermo-precipitin reaction as a general sero-diagnostic method; its use for diagnosing swine erysipelas, A. ASCOLI (*Berlin. Tierärztl. Wchnsch.*, 28 (1912), No. 10, pp. 165-167, figs. 3).—This reaction (E. S. R., 26, p. 376) can be employed without difficulty for diagnosing erysipelas in swine. The technique is given in detail.

Actinomycosis of the rectum in the horse, H. MARKUS (*Tijdschr. Veeartsenijk.*, 38 (1911), No. 9, pp. 349-353, pl. 1; *abs. in Vet. Rec.*, 24 (1911), No. 1221, p. 339).—The author records a case of this affection in a 4-year-old Oldenburg mare.

Studies on etiology of equine influenza, N. S. FERRY (*Abs. in Science*, n. ser., 35 (1912), No. 893, pp. 239, 240).—From each case of equine influenza studied the streptococcus described by Schütz was isolated from the trachea. The *Bacillus equisepticus* was never noted. In addition, a similar organism was isolated from the blood of 34 out of 63 cases. The organisms grew well symbiotically with the staphylococcus in broth cultures. It was possible for the organism to pass through the Berkefeld and Chamberland filters, and in all probability it assumes a minute size during its life cycle, as indicated by Basset (E. S. R., 26, p. 384).

The author was not able to differentiate between this organism and the streptococcus isolated from abscesses in the case of strangles. "If this proves to be the same organism that is found in strangles and also contagious pneumonia, and it is agreed by all authorities that the streptococcus found in strangles is the cause of that disease, then, we believe, we are justified in putting forward the argument that this streptococcus is the cause of the symptom complex we have termed 'influenza,' and that strangles and contagious pneumonia are not clinical entities, but complications of influenza due either to secondary infections or to extension of the primary disease."

In regard to the treatment of lymphangitis by "606," J. BRIDRÉ, L. NÈGRE, and G. TROUETTE (*Bul. Soc. Path. Exot.*, 4 (1911), No. 6, pp. 380-383).—The disease in all of its phases in horses and mules was treated successfully with Salvarsan (Ehrlich's 606). In all instances the diagnosis was confirmed by finding the micro-organisms in the pus. Only 1 out of 9 animals died.

Filaria immitis of the dog, D. ZISORDI (*Clin. Vet. [Milan]*, Sez. Prat., 33 (1910), Nos. 43, pp. 684-689; 44, pp. 697-704; 45, pp. 713-717; 46, pp. 734-740; *Jour. Trop. Vet. Sci.*, 7 (1912), No. 1, pp. 68-84).—A review of the subject is followed by reports of studies of 6 cases, together with a bibliography of 41 titles.

RURAL ENGINEERING.

Rules governing matters coming before the State Board of Irrigation, Highways, and Drainage ([Lincoln], Nebr., 1912, p. 22).—This pamphlet gives the rules of procedure adopted by the State Board of Irrigation, Highways, and Drainage of Nebraska governing matters coming before it relative to claims, applications, dams, petitions, and contests.

Irrigation pumping with electrical energy (*Elect. World*, 59 (1912), No. 15, p. 804).—An example of the use of electrical energy for irrigation pumping is noted, embracing an area of 10,000 acres and with 69 motor-driven pumping

plants having capacities ranging from 900 to 1,700 gal. per minute. The pumping system is owned by the farmers of the region, but the energy is developed by a private plant. It is claimed that the cost of the energy is less than 1 ct. per kilowatt hour.

The amount and frequency of irrigation as determined by the physical properties of the soil, A. MÜNTZ and E. LAINE (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 8, pp. 481-487; *Prog. Agr. et Vit. (Ed. West Centre)*, 33 (1912), No. 12, pp. 360-366; *Rev. Vit.*, 37 (1912), No. 955, pp. 460-464; *abs. in Rep. Sci. [Paris]*, 50 (1912), I, No. 9, pp. 284, 285).—Experiments were made to determine (1) the amounts of water most favorable to crops when applied at equal intervals, and (2) the influence on yield of the application of equal quantities of water at irregular intervals.

The results show that there is ordinarily a decided waste of water, as the real needs of plants are greatly exceeded. The authors are of the opinion that, although it is impossible to attain the ideal in the application of water, efforts should be made to approach it.

An interesting agricultural, hydraulic problem in Algeria, J. SAVORNIN and I. POUGET (*Bul. Soc. Hist. Nat. Afrique Nord*, 1910, Nos. 7, pp. 104-108, fig. 1; 8, pp. 123-127).—The authors present a solution to the problem of utilizing the basin and waters of a salt lake for irrigation purposes, viz, to divert the neighboring running water and rainfall waters into the lake and provide an outlet sufficient to lower the lake surface about 6 meters. These works, it is claimed, will reduce the surface evaporation, freshen the water, and keep a good supply of water on hand.

A diagram for converting square feet into acres in irrigation and drainage work (*Engin. and Contract.*, 37 (1912), No. 16, p. 450, fig. 1).—A combined table and diagram is presented and explained, giving accurate results to the third decimal place.

Cooperative methods in farm drainage, R. H. CLEMENS (*Canad. Farm*, 6 (1912), No. 13, p. 3, figs. 3).—The trouble and expense encountered in the ordinary drainage ditching methods are pointed out, and the economic and time-saving advantages of cooperative drainage-ditching operations are discussed.

Standard tests of drain tile and sewer pipe, A. MAESTON and A. O. ANDERSON (*Proc. Iowa Engin. Soc.*, 23 (1911), pp. 39-46).—This is a paper read before the Iowa Engineering Society, at Des Moines, February 15-17, 1911.

The need of standard tests for drain tile and sewer pipe is pointed out and 3 standard test requirements are recommended, viz, the percentage of absorption, the bearing strength, and the modulus of rupture, which requirements involve the absorption test and the bearing strength test. A discussion is given of various methods of making absorption and bearing strength tests, and specifications are recommended for making standard tests of this nature.

In the standard absorption test the specimens are to be of a definite size and number, perfectly dry and clean, and are to be weighed and then immersed in pure soft water for 24 hours. They are then to be taken out, reweighed, and the percentage of absorption calculated by the formula $\frac{W' - W}{W}$ = the percentage of absorption, in which W is the original weight and W' is the weight after immersion.

The standard bearing strength test embodies the following: The test specimens are to be whole, full-sized, dry, average tile, 5 in. diameter. They are to be weighed before the test and then bedded above and below in dry washed sand for one-fourth the circumference of the pipe. The top bearing must have a true plane lower surface of rigid material capable of distributing the test